SmartClient

User's Guide

Release 4.0

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1 Introduction

SmartClient is a generic client tool for use with alarm and event historians like ABB SmartLogger and ABB 800xA Information Manager, as well as event historians from other vendors.
It can in fact be used as front-end for any database table, but has many features that are custom designed for event handling and alarm management.
SmartClient has been designed for working with large tables and has a number of performance increasing features that makes it possible to work with millions of records. It also uses a Multiple Document Interface (MDI), which means that multiple tables can be opened simultaneously for viewing, comparison and other purposes.
The table views don't need to come from the same database. Several views from different databases and different database types can be opened simultaneously.

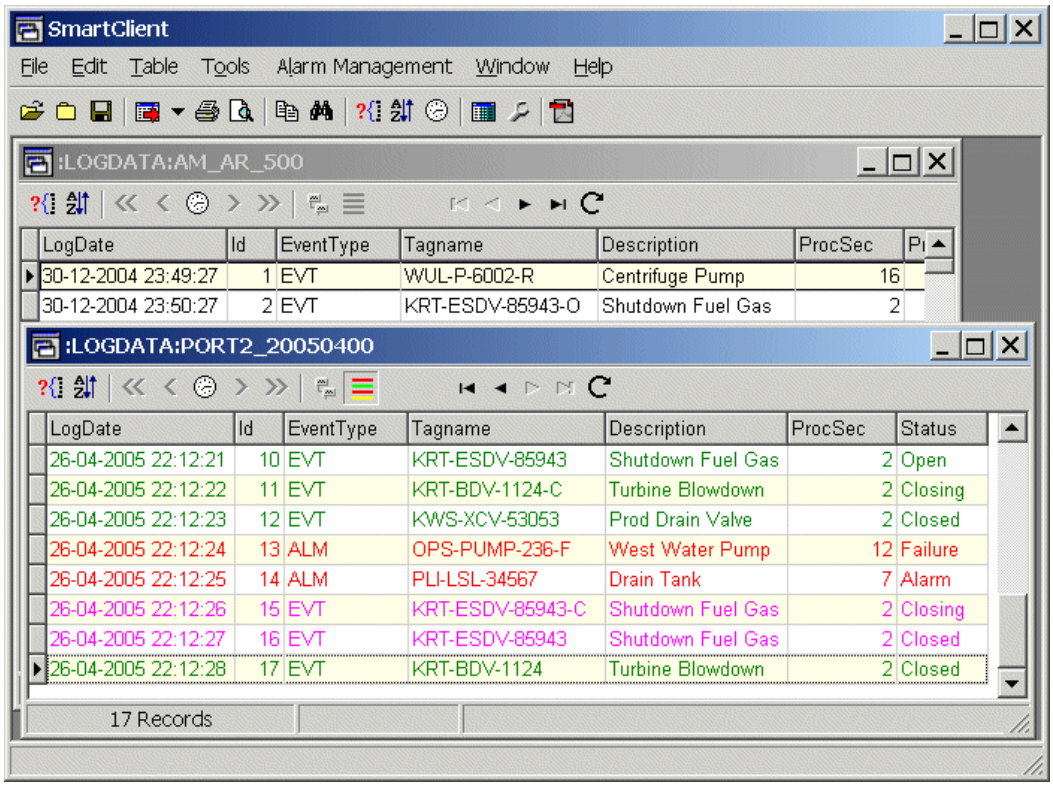

SmartClient
File Edit Table Tools Alarm Management Window Help
:LOGDATA:AM_AR_500
LogDate Id EventType Tagname Description ProcSec
30-12-2004 23:49:27 1 EVT WUL-P-6002-R Centrifuge Pump 16
30-12-2004 23:50:27 2 EVT KRT-ESDV-85943-O Shutdown Fuel Gas 2
:LOGDATA:PORT2_20050400
LogDate Id EventType Tagname Description ProcSec Status
26-04-2005 22:12:21 10 EVT KRT-ESDV-85943 Shutdown Fuel Gas 2 Open
26-04-2005 22:12:22 11 EVT KRT-BDV-1124-C Turbine Blowdown 2 Closing
26-04-2005 22:12:23 12 EVT KWS-XCV-53053 Prod Drain Valve 2 Closed
26-04-2005 22:12:24 13 ALM OPS-PUMP-236-F West Water Pump 12 Failure
26-04-2005 22:12:25 14 ALM PLI-LSL-34567 Drain Tank 7 Alarm
26-04-2005 22:12:26 15 EVT KRT-ESDV-85943-C Shutdown Fuel Gas 2 Closing
26-04-2005 22:12:27 16 EVT KRT-ESDV-85943 Shutdown Fuel Gas 2 Closed
26-04-2005 22:12:28 17 EVT KRT-BDV-1124 Turbine Blowdown 2 Closed
17 Records

Figure 1-1

Main window	
Menu	Please refer to section Menu overview for an overview of the menu layout.
Toolbar left	Toolbuttons for fast access to the most common functions.
Toolbar right	Table navigator for moving around the active table and On/Off buttons for the Query, Sort and Time View functions.
Table area	View area for open tables.
Status bar	Shows the status for the auto refresh function.

1.1 Conventions and definitions

	Important note
Alias	Database alias specifying database parameters like path and database driver.

AM	Alarm Management.
BDE	Borland Database Engine. A set of DLLs and support files that allow programs to access databases.
Control	The term 'control' is used when describing the user interface. A 'control' is a common name for edit boxes, push buttons and other items on a dialog.
Dataset	A collection of records fetched from the database server or the local database.
Dialog	A dialog is a "window" designed for user input.
Event	A common name used in the process industry for an occurrence, which is reported to an operator and/or a printer. An event in the SmartLogger terminology means a sequence of characters normally sent to the printer followed by a carriage return.
Field	A field corresponds to a column in a database table.
MDI	Multiple Documents Interface.
PDF	(Adobe) Portable Document Format. This is the format used for the online User's Guide.
Record	A record is one row of data (one event) in a database table.
SQL	Structured Query Language. Standard language for accessing databases.
WTS	Windows Terminal Services. Used in connection with the SmartClient version supporting WTS and Citrix servers.

2 Installation and Set-up

2.1 System requirements

Computer
A 100% IBM PC compatible computer with a Pentium III - 500 MHz processor and 128 MB RAM (256 MB or more recommended).
Supports a screen resolution of 800x600, but 1024x768 or higher is recommended.

Operating system
Windows 2000/2003/XP.

Disk space
30 MB free space for system files and additional space for log tables.

2.2 Installation

1. Place the SmartClient CD in the CD-ROM drive.
2. If autorun is activated on the PC, the installation will automatically start. If it does not start, run "?:\Setup" (substitute '?' with your CD drive letter)
3. Follow the instructions on the screen.

Online User's Guide
The online User's Guide is available from the menu item *Help* | *User's Guide*. To view this User's Guide, you must have Adobe® Acrobat® reader 6.0 or higher installed on your system.
The Acrobat Reader software can be downloaded from http://www.adobe.com.
Adobe® Acrobat® reader is copyright of Adobe Systems Incorporated.

Windows time format
Regardless of the Windows time settings, the SmartClient always uses 24-hour clock even though Windows might be set up to 12-hour clock (AM/PM).

2.3 Product registration

When SmartClient is started for the first time after installation, the registration dialog will appear.

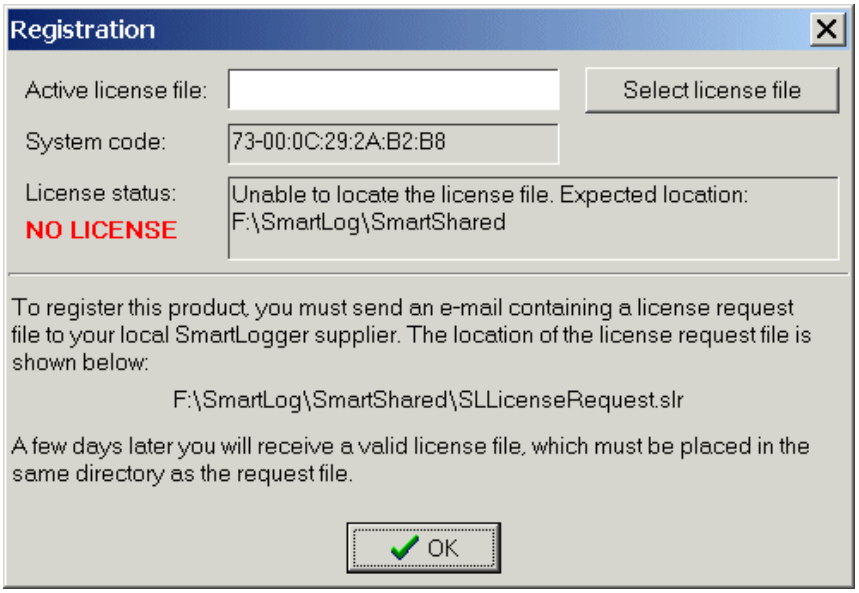

Registration
Active license file:
Select license file
System code:
73-00:0C:29:2A:B2:B8
License status:
NO LICENSE
Unable to locate the license file. Expected location:
F:\SmartLog\SmartShared
To register this product, you must send an e-mail containing a license request file to your local SmartLogger supplier. The location of the license request file is shown below:
F:\SmartLog\SmartShared\SLLicenseRequest.slr
A few days later you will receive a valid license file, which must be placed in the same directory as the request file.
OK

Figure 2-1

The dialog can also be shown by selecting Help | Registration from the menu.

If a license file is available this can be applied by pressing the *Select license* button. If no license file is available, you must send the *license request file* to your local SmartLogger supplier for registration.

The license file is hardware dependent. It is therefore *very* important to generate the license request file on the computer intended for running the SmartClient application.

When a valid license file is registered, the Registration dialog can no longer be called up from the menu.
If you wish to purchase add-on's like Analyze Tools later on, you have to contact your local SmartLogger supplier to obtain a new license file.

3 Basic Operations

3.1 Menu overview

Menu	Item	Description
File	Open...	Opens the Opening a table dialog.
	Open current SL tables▸[1]	Opens the currently active SmartLogger table.
	Close	Closes the active table.
	Close All	Closes all active tables and disconnects from all databases.
	Save View As...	Opens the Save View As dialog.
	Export▸	Sub menu for exporting the active table to a Text, Excel, HTML or XML file.
	Print...	Opens the Print dialog.
	Print Preview...	Shows a Preview of the report.
	Recent Table List	Shows a list of the most recent opened tables.
	Exit	Exit program.
Edit	Copy	Copies selected record(s) to the clipboard.
	Find...	Opens the Find Record dialog.
Table	SQL Query...	Opens the SQL Query dialog.
	SQL Sort...	Opens the SQL Sort dialog.
	Time View...	Opens the Time View dialog.
Tools	Alias Manager	Opens the Database Alias Manager tool.
	Table Merge...	Opens the Table Merge dialog.
	Options...	Opens the Options dialog.
	WTS Information[2]	Shows miscellaneous information about the current WTS settings. Refer to section WTS Information.
Alarm Mgt.		Gives access to the different alarm management functionality as explained in section Alarm Management (Add-on).[3]
Window	Tile Horizontal	Tiles all open tables horizontally.
	Tile Vertical	Tiles all open tables vertically.
	Cascade	Cascade all open tables.
	Arrange Minimized	Minimized windows are rearranged at the bottom of the main window.
	<Table list>	Quick access to all currently opened tables. If a table is minimized, it will automatically be maximized.
Help	User's Guide	Shows this User's Guide in PDF format.
	Registration...[4]	Opens the Product registration dialog.
	About...	Shows the credits and the release version.

3.2 Opening a table

The Open Table dialog can be opened from the menu item *File* | *Open...* or the associated toolbar button:

[1] Only available if SmartLogger is installed on the same PC.
[2] Only visible if the SmartClient is the special version for Windows Terminal Services and Citrix.
[3] Only available if you have purchased and registered the Analyze Tools Add-on.
[4] Only visible if SmartClient is unregistered.

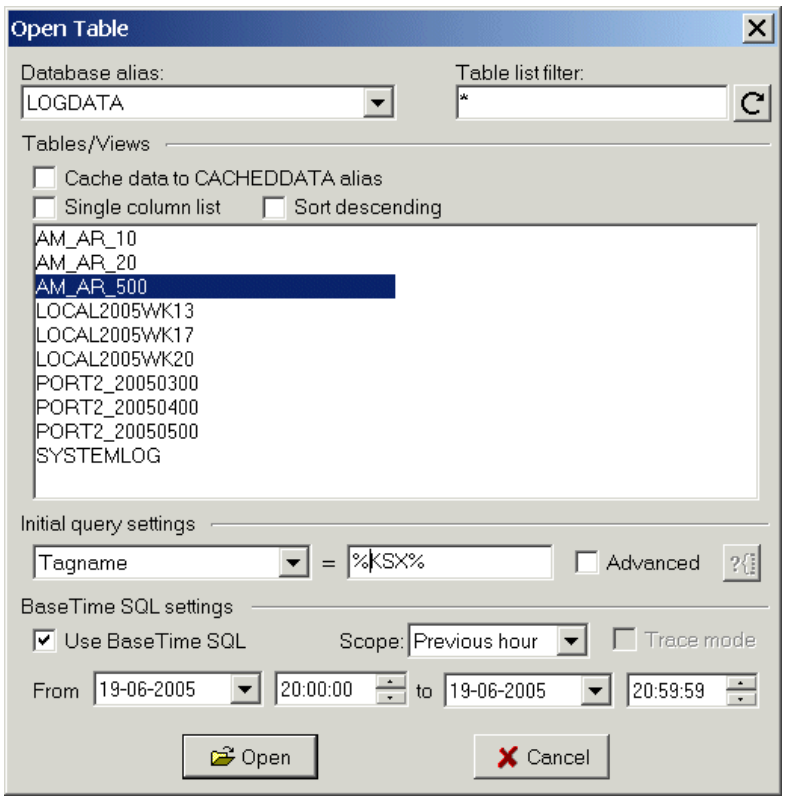


Figure 3-1

Open Table	
Database alias	Contains all available aliases.
A - button	Advanced options.[5] Please refer to section Advanced Options.
Table list filter	Filter input control used to restrict the number of tables shown in the table list. Standard wildcards like '*' and '?' are accepted.
Refresh button	Refreshes the list of tables.
Tables/Views	
Cache data...	When checked, all table records are cached to a local table before this table is opened. All subsequent operations will be performed on the local table. This feature is especially useful when requesting data via slow networks.
Sort descending	Toggles the sort order between ascending/descending for the table/views listed.
Single column list	Enables/disables the use of multiple columns in the table list.
Tables	Lists all available tables for the selected alias that matches the specified filter
Initial query settings	
Initial query controls	Instead of retrieving all records in a table, it is possible to limit the number of records initially returned. All subsequent operations will be performed on this limited set of data. However, it is possible for the user to clear or modify this query after the initial opening of the table. The dropdown list with fieldnames and the edit field for the query criteria is known as the "initial query" controls.

[5] This button is only visible for aliases connected to server-based databases, like Oracle or MS SQL Server.

Advanced query button	The same as the initial query, except that a more advanced query can be specified. For information about the query builder refer to section SQL Query.
BaseTime SQL settings	
Use BaseTime SQL	Check to limit the time scope when the table is initially opened.
BaseTime SQL settings	Only visible if "Use BaseTime SQL" is enabled. Refer to the description in section BaseTime SQL.

3.2.1 Supported tables

The SmartClient can be used against *any* table and not only the ones created by the Smart* applications.
However, there are a few limitations:

- Features like BaseTime SQL and Time View will only be available if a DateTime field is present in the table. SmartClient will use the first DateTime field found unless otherwise specified by the user, as described in section Field Customisation Panel.
- The maximum allowed fields in a table is 30.

3.2.2 BaseTime SQL

The BaseTime SQL is used to limit the number of records fetched from the table when it is initially opened.
When BaseTime SQL is *not* applied, all records are fetched from the table when it is opened.
When BaseTime SQL is applied, only records that fall within the specified time scope are fetched from the table. Any further data manipulation, like queries and analysis, will only be performed on these records.

3.2.3 Filter

The filter is used to reduce the number of tables shown in the table list.
When working with Oracle tables, the filter has an extra feature. If the filter control is cleared, and the Refresh button is pressed, then all tables available to the current user will be shown - not just the tables *owned* by the current user.
Tables owned by other users will be shown as <user name>.<table name> in the table list and can be opened like any other SmartLogger table.

Filter example
A filter with the value ESD* will list the tables ESD_PROD19990200 and ESD19981100. A filter with the value ESD??????00 will only list the table ESD19981100.

3.2.4 Advanced Options

For server-based databases it is possible to be more specific about which tables that should be listed in the table list.
Depending on the chosen list type, tables belonging to the listed users will be included or excluded.

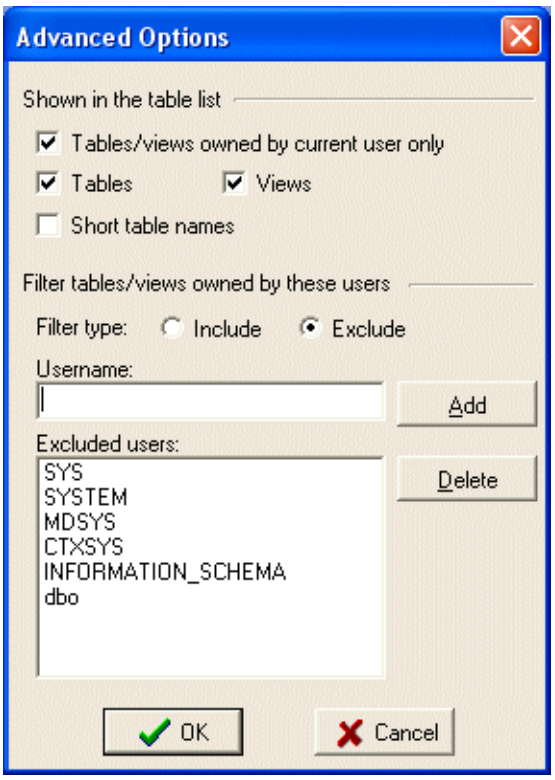


Figure 3-2

Advanced Options	
Tables/views owned...	If checked, only the tables owned by the user currently logged in, is shown. Otherwise all tables available to the current user is shown in the form "<Table owner>.<Table name>"
Tables	If checked, available tables are shown.
Views	If checked, available table views are shown.
Short table names	If checked, only the string after the last '.' in the full table name is shown. I.e. if a table is called MYUSER.SYSTEM.VALVESTAT, only the name VALVESTAT is shown in the table list.
Filter tables/views....	*Include*: Only tables and views owned by the specified users will be shown in the table list. *Exclude*: All tables and views owned by the specified users will *not* be shown in the table list.

3.3 Save View As

The Save View As dialog can be opened from the menu item *File* | *Save View As...* or from the associated toolbar button:

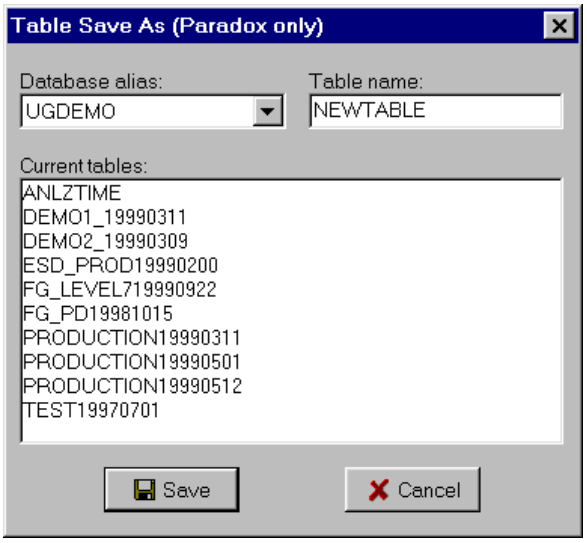


Figure 3-3

Save View As	
Database alias	Specifies the destination database alias. Note that only Paradox aliases are listed here.
Table name	Specifies the name of the new table.
Current tables	Contains all available tables for the selected database alias.

The Save View As feature will save the active table view to a new Paradox table. This means, that only the records matching the active table's current sort, query and time view settings will be saved to the new table.
This feature can be used to make subsequent analysis much faster since it is possible to store the relevant events in a separate table, and perform the analysis on this new and reduced table instead.

3.4 Print

SmartClient uses an advanced printing system with a lot of advanced features. This User's Guide only describes the use of the most essential parts on the printing system, but the user is encouraged to experiment with all the other features it offers.
The Print dialog can be opened from the menu item *File* | *Print...* or from the associated toolbar button.

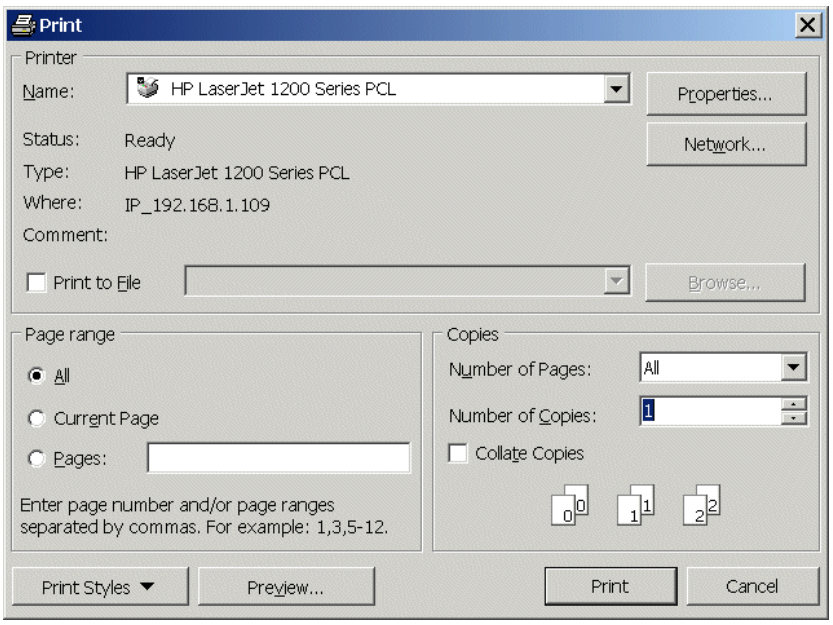


Figure 3-4

> Printing requires the grid to be in LoadAllRecords mode (refer to section LoadAllRecords Mode).

3.4.1 Page Setup

Determines the layout of everything outside the data area, like:

- Page sizes, print orientation, print order
- All margins
- Header/footer texts
- Report scaling

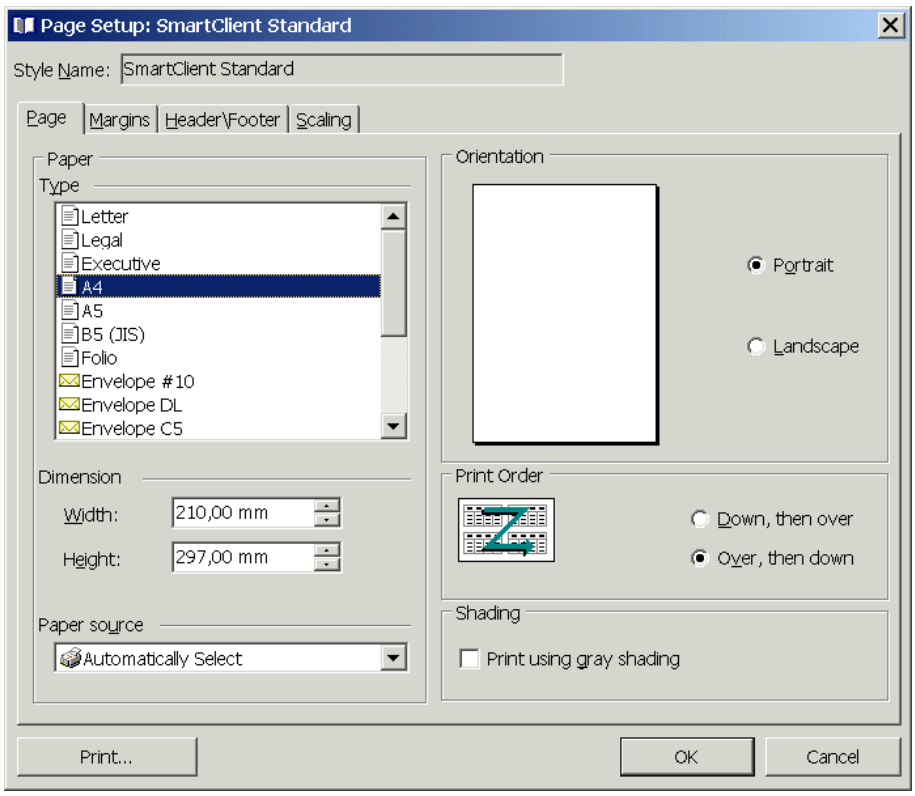


Figure 3-5

> To exclude fields from a report, please refer to section Field Customisation Panel.

3.4.2 Report Design

Determines the layout of the report data, like:

- What to show (header, footer, grid, bands)
- Colours (grid, header, footer)
- All fonts used
- Behaviours (3D effects, graphics)

The report designer can be opened from the Preview dialog (refer to section Preview).

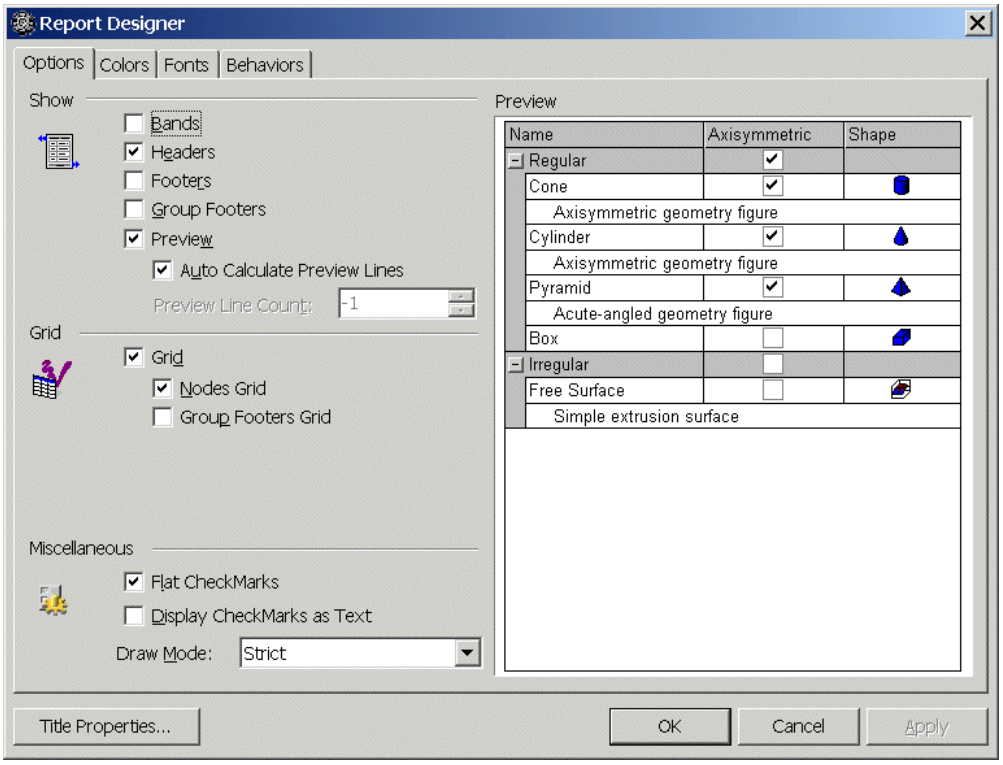
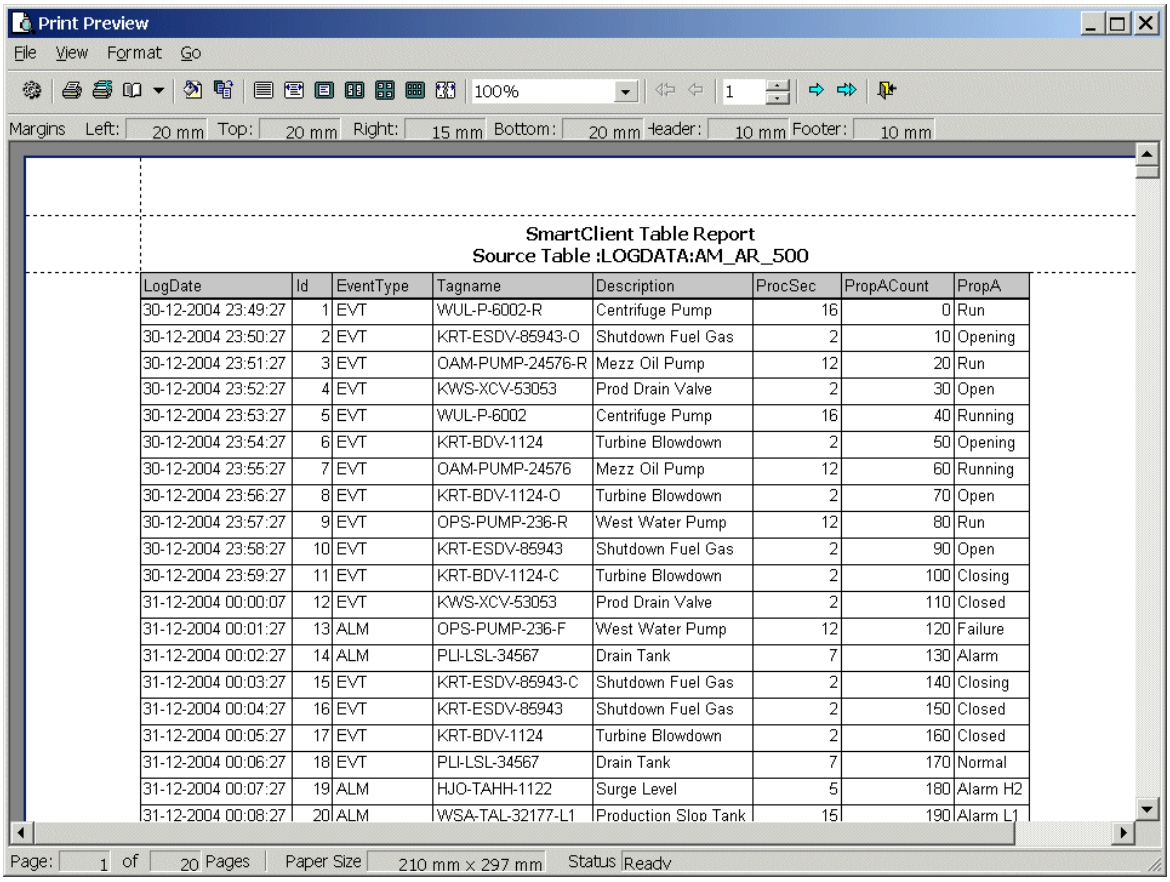


Figure 3-6

3.4.3 Preview

Shows how the actual report will look when printed.
All print set-up dialogs can be accessed from the preview dialog, including a few additional, like the page background configuration.

> Holding down the CTRL button and spinning the mouse wheel will zoom the print preview in/out.


Print Preview
File View Format Go
100%
Margins Left: 20 mm Top: 20 mm Right: 15 mm Bottom: 20 mm Header: 10 mm Footer: 10 mm
SmartClient Table Report
Source Table :LOGDATA:AM_AR_500
Page: 1 of 20 Pages Paper Size 210 mm x 297 mm Status Ready

LogDate	Id	EventType	Tagname	Description	ProcSec	PropACount	PropA
30-12-2004 23:49:27	1	EVT	WUL-P-6002-R	Centrifuge Pump	16	0	Run
30-12-2004 23:50:27	2	EVT	KRT-ESDV-85943-O	Shutdown Fuel Gas	2	10	Opening
30-12-2004 23:51:27	3	EVT	OAM-PUMP-24576-R	Mezz Oil Pump	12	20	Run
30-12-2004 23:52:27	4	EVT	KWS-XCV-53053	Prod Drain Valve	2	30	Open
30-12-2004 23:53:27	5	EVT	WUL-P-6002	Centrifuge Pump	16	40	Running
30-12-2004 23:54:27	6	EVT	KRT-BDV-1124	Turbine Blowdown	2	50	Opening
30-12-2004 23:55:27	7	EVT	OAM-PUMP-24576	Mezz Oil Pump	12	60	Running
30-12-2004 23:56:27	8	EVT	KRT-BDV-1124-O	Turbine Blowdown	2	70	Open
30-12-2004 23:57:27	9	EVT	OPS-PUMP-236-R	West Water Pump	12	80	Run
30-12-2004 23:58:27	10	EVT	KRT-ESDV-85943	Shutdown Fuel Gas	2	90	Open
30-12-2004 23:59:27	11	EVT	KRT-BDV-1124-C	Turbine Blowdown	2	100	Closing
31-12-2004 00:00:07	12	EVT	KWS-XCV-53053	Prod Drain Valve	2	110	Closed
31-12-2004 00:01:27	13	ALM	OPS-PUMP-236-F	West Water Pump	12	120	Failure
31-12-2004 00:02:27	14	ALM	PLI-LSL-34567	Drain Tank	7	130	Alarm
31-12-2004 00:03:27	15	EVT	KRT-ESDV-85943-C	Shutdown Fuel Gas	2	140	Closing
31-12-2004 00:04:27	16	EVT	KRT-ESDV-85943	Shutdown Fuel Gas	2	150	Closed
31-12-2004 00:05:27	17	EVT	KRT-BDV-1124	Turbine Blowdown	2	160	Closed
31-12-2004 00:06:27	18	EVT	PLI-LSL-34567	Drain Tank	7	170	Normal
31-12-2004 00:07:27	19	ALM	HJO-TAHH-1122	Surge Level	5	180	Alarm H2
31-12-2004 00:08:27	20	ALM	WSA-TAL-32177-L1	Production Slop Tank	15	190	Alarm L1

Figure 3-7

3.5 SQL Query

A query is a powerful tool for extracting useful information from tables. It can, for example, be used to:

- Exclude irrelevant records.
- Find out how often certain items have performed a specific action.
- Find out how many times a specific entry occurs.
- Locate a specific event.

The query dialog is used to set up the query definition and can be opened by selecting the menu item *Table* | *Query...*

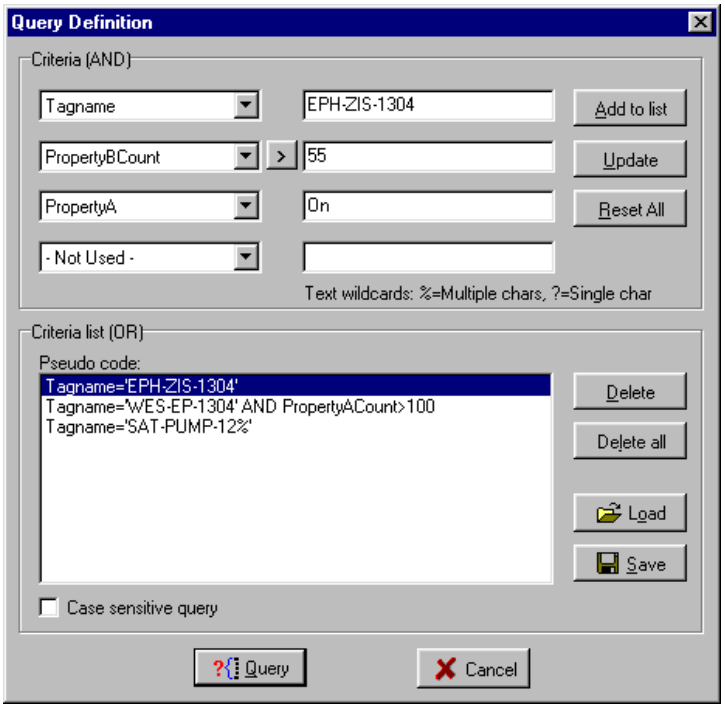


Figure 3-8

Query Definition	
Criteria (AND)	One AND criteria is composed by up to 4 field criteria's AND'ed together. This AND criteria can be added to the criteria list.
Criteria list (OR)	The criteria list holds a number of AND criteria's that, at the time the query executes, are combined to one SQL statement.
'Criteria' buttons	If a field is a numeric field, a small 'criteria' button will be visible between the field name and the edit box. This button can be used to specify a range of numerical values. When it is pushed, it toggles between '=', '<', '>' and '<>'.
Case sensitive query [6]	If checked, only text that exactly matches the query criteria is accepted, i.e. "Pump Control" does not match "PUMP CONTROL".
Load [7]	Load a previously saved query definition.
Save	Save the current query definition to a file.

3.5.1 Query examples

Exact match

If you want to see all records where the Tagname field contains the exact string 'HAS-OV-12222', you simply enter:

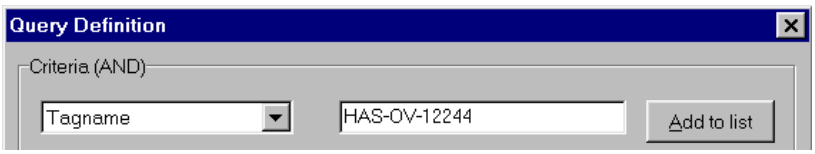


Figure 3-9

[6] Will be disabled, if the database does not support case sensitivity.
[7] A query can only be loaded, if field names/types used in this saved query matches the table structure of the current table.

Combined AND criteria
If you, in addition to the Tagname criteria, only want to look at records where PropertyACount is greater than 50, then you additionally enter:

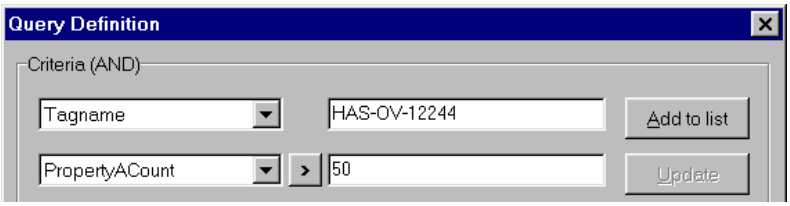


Figure 3-10

Using multiple character wildcards
If you, in addition to the criteria's above, only want to look at records where Description starts with 'Flare', then you must enter:

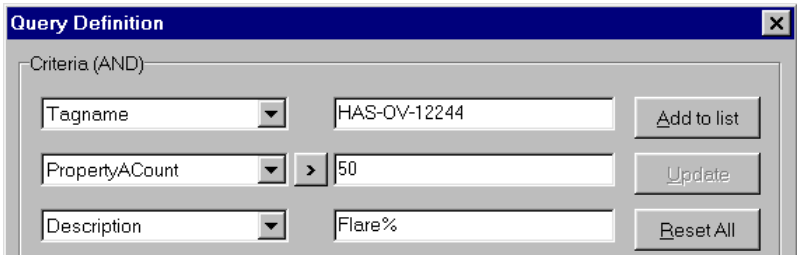


Figure 3-11

It is also possible to use multiple wildcards in a single criterion. If you, for example, want to extract all records, where the Tagname starts with "KKS" and contains the characters "ZSC", the criteria should be "KKS%ZSC%".

A wildcard is only valid for character fields.

Adding multiple criteria's (OR)
To add another criteria to this query, click on the "Add to list" button, and the AND criteria just specified, will be added to the criteria list. In this example we now specify another criterion, which singles out the events where Tagname equals EEF-P-7075 and with PropertyBCount less than 15. The query should now look like shown in Figure 3-12.

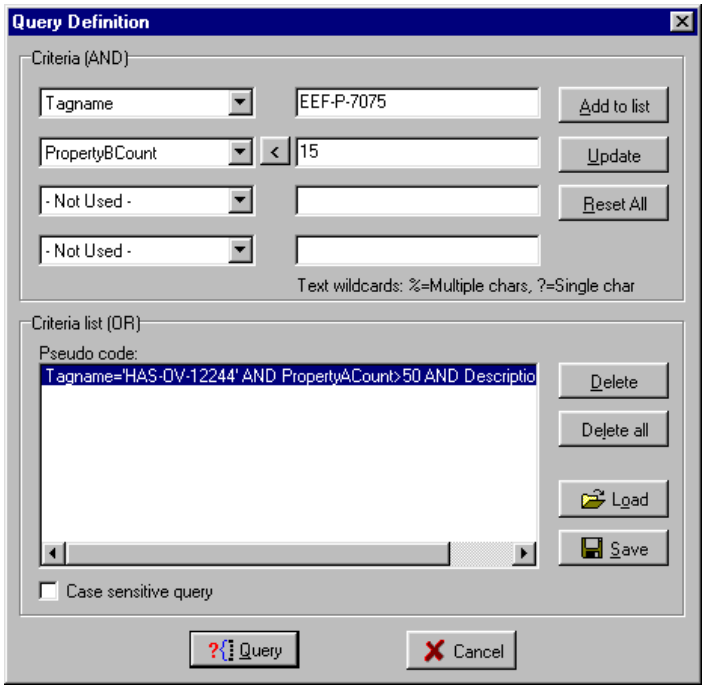


Figure 3-12

When the Query button is pushed, the SQL query statement will be composed by the statements in the list and the criteria in the AND section. In this example, the logical query will look like this:

```
(
  Tagname = HAS-OV-12244 AND
  PropertyACount > 50 AND
  Description = Flare%
)
OR
(
  Tagname = EEF-P-7075 AND
  PropertyBCount < 15
)
```

Wildcards - single characters

For all databases, the '_' (underscore) character is used as "single character" wildcard. I.e. if you want to locate all Tagnames starting with "HA-T-" and "HA-S-", but want to exclude Tagnames starting with "HA-DX-", the criteria should be: HA-_-%.

> When using the wildcards as literal characters, a backslash ''\' must be placed in front of the wildcard. I.e. to locate all Tagnames starting with "HA_", the criteria should be "HA_%".

3.6 Time View

The Time View function is used for setting up a view for a desired time period. While active, only records matching the Time View settings will be shown in the table window. The Time View dialog can be opened by selecting the menu item *Table* | *Time View...*

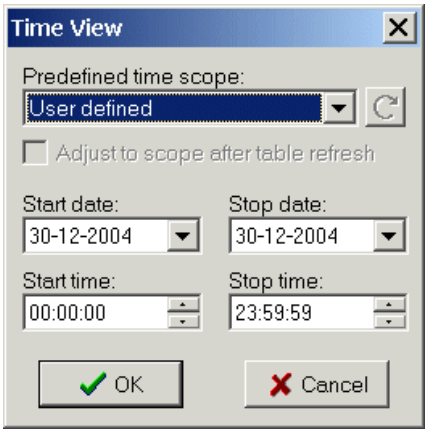


Figure 3-13

Time View	
Predefined time scope	Offers a number of pre-defined time scopes.
Adjust to scope...	If checked, the date/time settings will be adjusted every time a table is refreshed. I.e. the date/time settings will be adjusted to the current date/time of the PC.
Refresh button	Is only available when the time scope differs from "User defined". When pushed, the date/time settings are adjusted to match the current time scope setting.
Start Date/Time	Specifies the start date and start time of the desired time scope.
Stop Date/Time	Specifies the stop date and stop time of the desired time scope.

Please note that under certain circumstances, the SmartClient may force a date/time format different from the Windows settings, as shown in the table below.

Windows setting	**SmartClient forced format**
12-hour clock (AM/PM)	24-hour clock
2-digit year (00-99)	4-digit year
Space as time separator	':' as time separator
Space as date separator	'-' as date separator

The Time View can be enabled/disabled from the on/off tool button located next to the table navigator on the toolbar in the main window.

3.7 Find Record

In addition to the query function there is a faster way to locate a specific field value. The Find Record function can locate information found in any one of the table fields. It supports search facilities like "Starts with...", "Whole word only", "Substring", case sensitivity and wildcards.

The Find Record dialog can be opened by selecting the menu item *Edit* | *Find...*

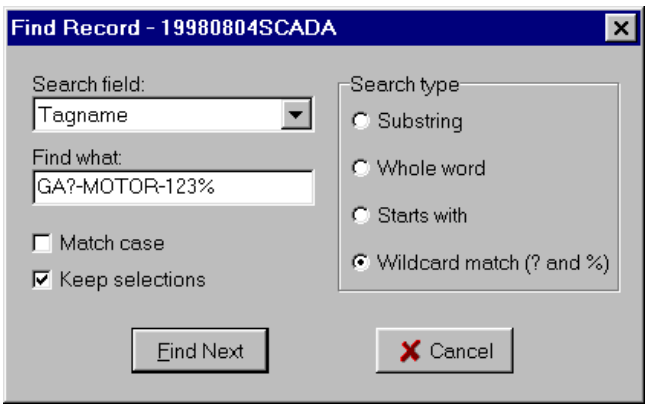


Figure 3-14

Find Record	
Search field	Specifies the field to search.
Find what	Enter your search criteria. If wildcards are to be used, the "Wildcard match" search type must be enabled.
Match case	Only locate records where the case matches.
Keep selections	If checked, each record found during the search is marked. At the end of the search, all marked records can then be copied to the clipboard or saved to a file.
Search type	
Substring	Find the search string anywhere in the field.
Whole word	Only find fields where a stand-alone word matches the search string.
Starts with	Only find fields that start with the search string.
Wildcard match	Use this type if wildcards are to be used in the search. Multiple character wildcard is '%' and single character wildcard is '?'. Wildcards can be combined like “Com%s?”, which will find “Compose”, “Compass”, but not “Composition”.

Note that although the Find dialog stays on top, when you switch between the different tables, the Find dialog remembers the settings specified for each table. This means that the search settings do not have to be re-entered, when switching between the opened tables.
The Find settings are only remembered as long as the table is open.

3.8 SQL Sort

With the sort function, it is possible to sort the records in the table
The Sort Table dialog can be opened by selecting the menu item *Table* | *Sort...*

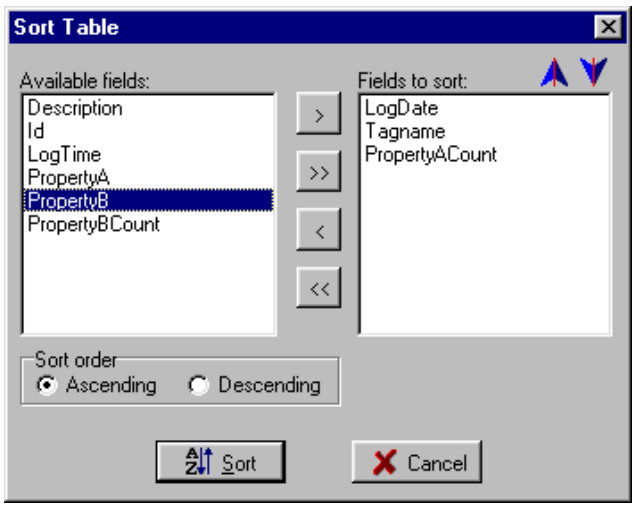


Figure 3-15

Sort Records	
Available fields	Contains a list of all available fields.
Fields to sort	Lists the fields to be used for the sort operation in descending priority.
Sort order	Choose ascending or descending sort order for the sort operation.
Up/Down arrows	Use these arrows to change the sort order.

Fields can be moved between the list boxes by double clicking on the field name or by using the "move" buttons in the centre of the window.
To reset the sort order, remove all fields from the "Fields to sort" list box and click OK.

> Although the records are re-fetched from the database server, the records are only sorted in the table grid.
> I.e. the underlying source table is not affected.

3.9 Copy selected records

This feature can be accessed from the menu item *Edit* | *Copy*

To select more than one record, do one of the following:

- Press and hold down the SHIFT key while pressing the up/down key.
- Press and hold down the CTRL key while selecting records with the mouse.
- Select a record with the mouse, hold down the SHIFT key and select another record. All records in between these two selections will now be selected.

To copy the selected records to the clipboard, use one of the following methods

- Select the menu item *Edit* | *Copy*
- Right click in the table grid to bring up a small copy/export menu.

4 Maintenance

4.1 Options

The Options dialog can be opened by selecting the menu item *Tools* | *Options...*

4.1.1 Database

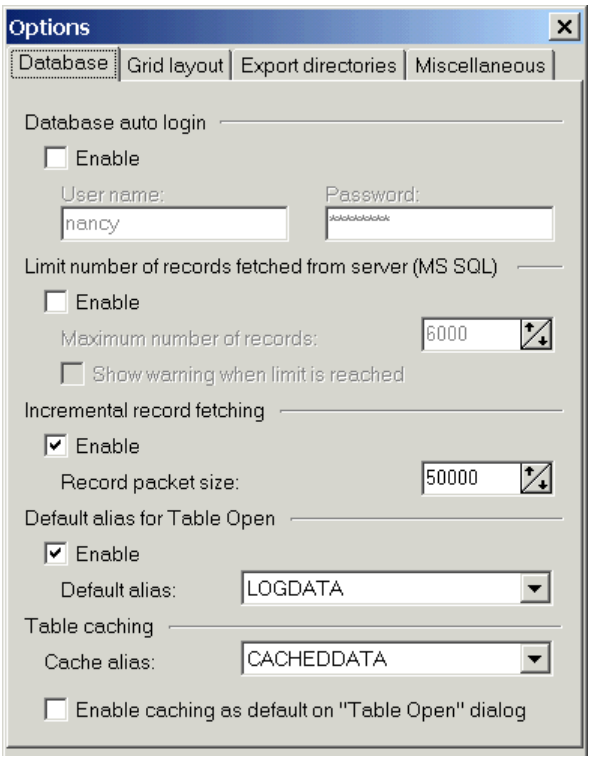


Figure 4-1

Database	
Database auto login	If enabled, SmartClient will attempt to log on to a database with the specified user name and password. This can be used to avoid a user name / password dialog every time a table is opened [8]
Limit number of records...	If enabled, record sets from the SQL server will be limited to the number of records specified. This feature *only* works for MS SQL Server databases.
Incremental record fetching	If enabled, SmartClient uses a technique where only a specified number of records are fetched upon request (record packet size). See also description below.
Default alias	If specified, then this alias will always be initially selected when the Table Open dialog is opened. Otherwise the previously selected alias will be used.
Table caching	This alias specifies where the cached tables should be placed. Table caching is explained in section Opening a table. "*Enable caching...*" specifies if table caching should be chosen as the default option when opening a table from the Table Open dialog.

[8] When using different databases with different users/password, this option *must* be disabled.

Incremental record fetching
When a table is opened, only one packet of records is fetched from the table instead of all records as normal. This significantly shortens the time it takes to open a table.
When scrolling through the table, new packets are fetched from the database when required.
Unless working with small local tables, it is recommended to enable this option, as it improves the execution times for sort, query and table open operations.
When incremental record fetching is enabled, the number of records shown in the lower left corner of the table window will show: "Fetched: xxx" records instead of "xxx records". This number (xxx) will then be the number of records fetched so far and not the total number of records in the table.

4.1.2 Grid Layout

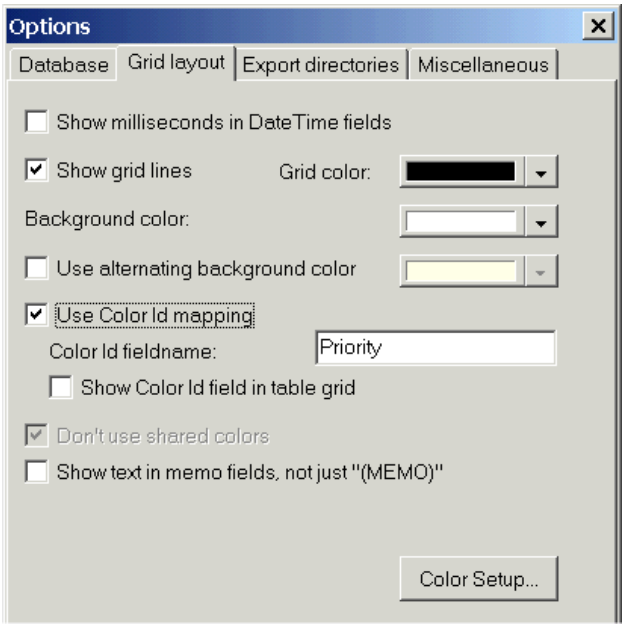


Figure 4-2

Grid Layout	
Show milliseconds...	Toggles the millisecond presentation on/off in time fields
Show grid lines	Toggles the table grid lines on/off.
Grid color	Color of the grid lines.
Background color	Color of the background behind the records.
Use alternating...	If checked, every second record in the grid has a different color that can be specified here. This option is especially useful when there are no grid lines shown.
Use Color Id mapping	If enabled, SmartClient uses a technique called Color Id mapping. See also description below.
Color Id fieldname	When Color Id mapping is enabled, it must be specified which field in the table that should be used for Color Id mapping.
Show Color Id field...	Specifies if the table field used for Color Id mapping should be shown in the table grid.
Don't use shared colors	Normally SmartClient shares the color definitions with the SmartLogger application. If this option is checked, the colors set up in SmartClient will *not*

	affect the SmartLogger...and the other way around.
Show text in memo fields...	Normally the content of memo fields are not shown in the table grid, since the columns then would have to be very wide. If this setting is enabled, the content will be shown.

Color Id mapping.
This technique can be used when there is an integer field in the table containing values between 1-16. Each value is associated with a color, thereby making it possible to show/print records with individual colors. How to set up the colors is explained in section Color Setup.

4.1.3 Color Setup

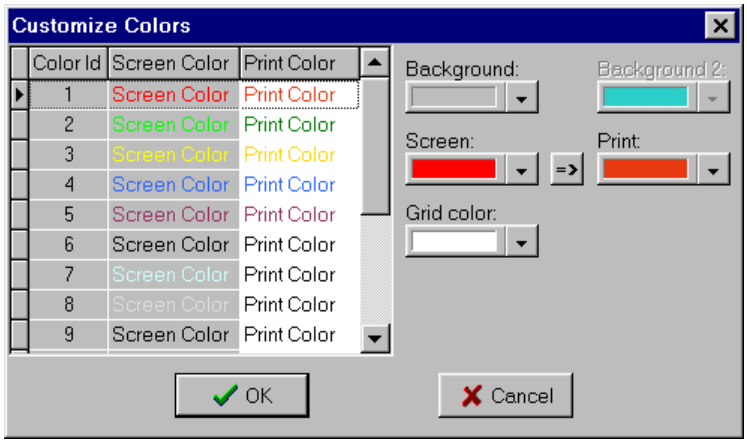


Figure 4-3

For each of the color Id's from 1-16, it is possible to specify which color should be used for the matching record on screen an on a printout.
To change a color, simply select a Color Id in the grid and set the desired color.
It is possible to select from a number of standard colors, but a user-defined color can also be composed/selected as shown in Figure 4-4.

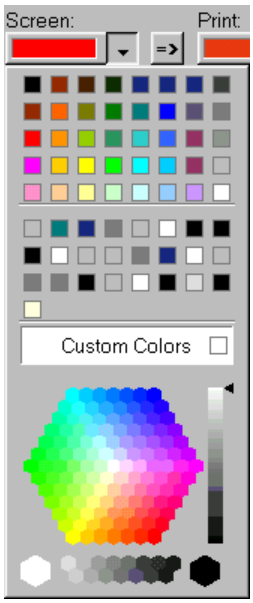


Figure 4-4

4.1.4 Export directories

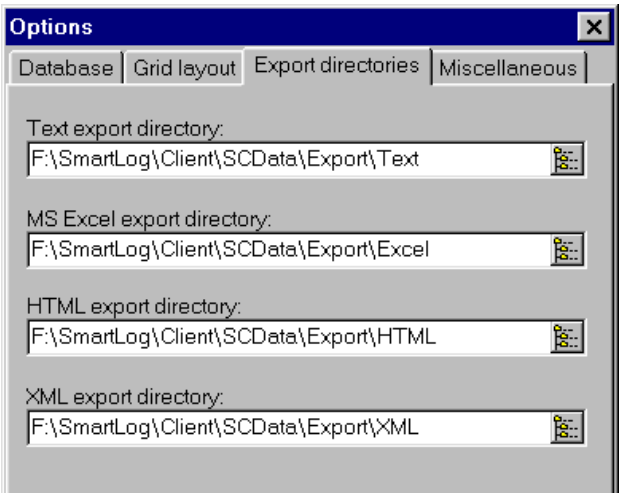


Figure 4-5

Export directories	
Text export...	Default destination directory for Text exports.
MS Excel export...	Default destination directory for MS Excel exports.
HTML export...	Default destination directory for HTML exports.
XML export...	Default destination directory for XML exports.

4.1.5 Miscellaneous

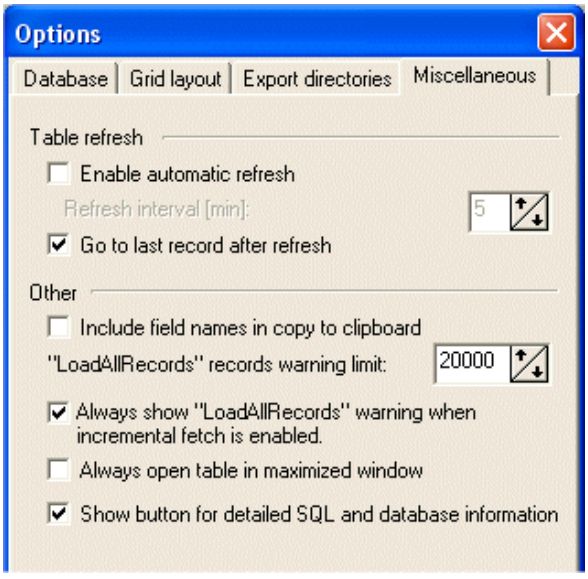


Figure 4-6

Miscellaneous – Table refresh	
Automatic refresh / Refresh int.	When enabled, all tables currently opened will be automatically refreshed using the interval specified in "Refresh interval".
Go to last...	If checked, the table cursor is moved to the last record after a refresh (manual or automatic) has been executed. This operation should be used carefully when viewing large tables, as it may

	take some time to perform.
Miscellaneous – Other	
Include field names...	When this option is checked, the first line in the copy will contain the field names.
LoadAllRecords records warning....	Some functionality requires the grid to be in LoadAllRecords mode (refer to section LoadAllRecords Mode). Switching to this mode may take a while if the dataset contains many records. If the number of records exceeds the limit specified here, the user is given a warning.
Always show LoadAllRecords	When incremental fetching is enabled, the total number of records in the dataset is unknown. If this option is enabled, a warning is issued when LoadAllRecords mode is about to be activated. This is to inform the user, that a lot of records might be loaded, if the user continues.
Always open table....	When enabled, all table windows are maximized when opened.
Show button for...	If checked, there will be an extra button on the toolbar in the table windows. This is used for detailed information about the current table and the SQL statements used to get data.

5 Utilities

5.1 Table Export

The export utility makes it possible to export an entire table, or part of it, to another format than a database table.
SmartClient supports four different formats as explained in the following.

> The export utility operates on current the table view, i.e. only records matching the active query, sort and time view settings are exported.

5.1.1 Text Export

From the export dialog the text format can be customised to match any user requirements.

The Text Export dialog can be opened by selecting the menu item *File* | *Export...*

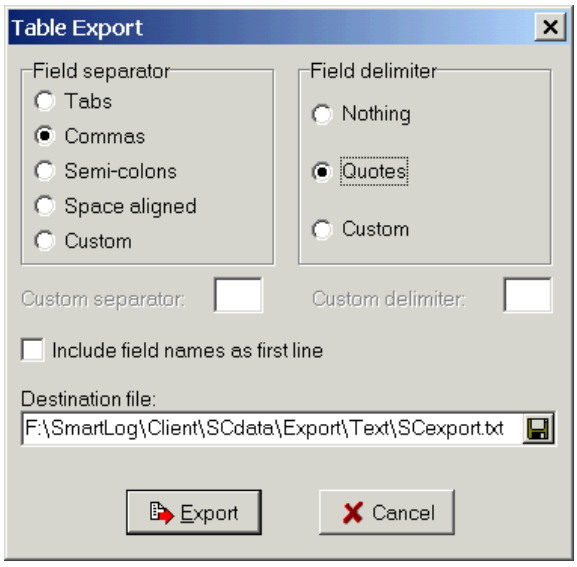


Figure 5-1

Table Export	
Field separator	The character used as separator for each field value in the exported text. If "Space aligned" is chosen, every field will be padded with spaces, so that the length of the text always corresponds to the size of the field. I.e. if the field size is 10 and contains the data "Alarm", the exported text would be "Alarm " (5 spaces added to the text).
Field delimiter	The delimiter 'surrounding' each field value.
Custom sep./delim.	If the Custom button is selected, it is possible to specify any character.
Include field names...	If checked, the first line in the export file will contain the field names. This line will be formatted the same way as the record lines.
Destination file	Select the 'browse' button at the right of the control to specify the location and name of the export file.

5.1.2 HTML Export

The records are exported to one HTML file containing a table with all records.

5.1.3 MS Excel Export

The records are exported to an MS Excel worksheet. The layout of the worksheet will be the same as shown in the SmartClient table grid. I.e. the order of the fields, the field alignment and the size of each field, will be as shown in the table grid.
The file can be read by all MS Excel versions from 4.0 and up.

5.1.4 XML Export

The records are exported to a XML/XSL file.

5.2 Table Merge

With the Table Merge function it is possible to merge multiple tables, with the same structure, into one table. This is useful if, for example, data is stored in monthly tables, but an analysis covering the entire year is needed.

> In order to perform a merge, all source tables *must* have exactly the same table structure. This means equal number of fields, identical field names, identical field sizes etc.
> An exception is character fields, where different field sizes are allowed.

The Table Merge dialog can be opened by selecting the menu item *Tools* | *Table Merge...*

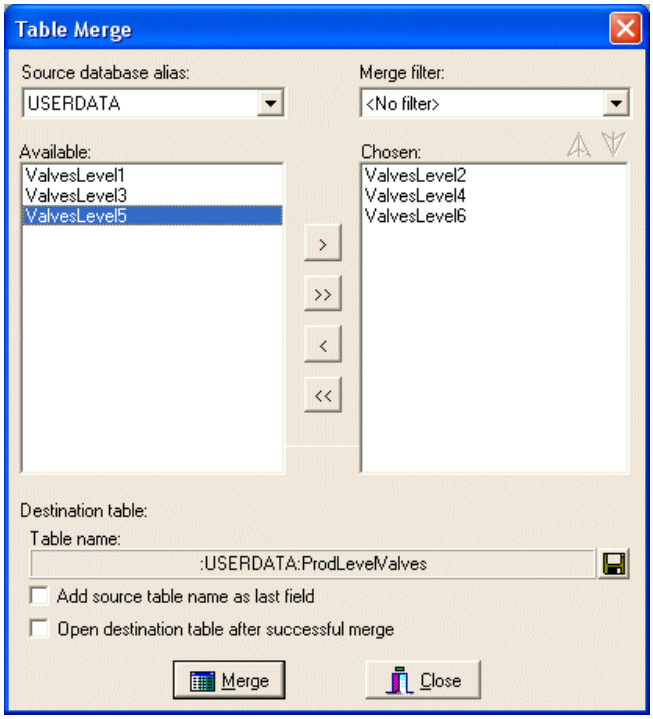


Figure 5-2

Table Merge	
Source Database Alias	Specifies the location of the source tables.

Merge filter	Optional filter that can be applied to each table *before* it is merged[9]. Thereby only specific records will be included in the merged table. Refer to section SQL Query for a description of how to specify filters.
Available	Lists all available tables for the selected alias.
Chosen	Lists all tables selected for merge.
Up/Down arrows	Use these arrows to change the merge order. The tables are merged in the listed order, meaning that events in the first table will be positioned at the top of the destination table.[10]
Destination table	
Table name	Name of the new table to be created. Pressing the small button to the right of the table name will call up the Table Save As dialog.[11]
Add source table name as last field	If checked, the Merge operation will add an extra field to the destination table [12]. This field will, for each record, contain the name of the source table.
Open destination...	If checked, the Merge dialog is closed and the new table is opened immediately after successful merging.

5.3 Database Alias Manager

A database alias is needed in order to access a database. It defines the database driver, connection parameters and the destination path / database type.
The Alias Manager can be used to add, modify and delete aliases, with the restriction that only the basic settings, like database driver, destination path/database, default user etc. can be changed.
Normally the user only needs to access the basic settings, as the Alias Manager automatically configures all advanced settings.

If it is required to access the more advanced alias settings, the BDE Administrator tool has to be used. The BDE Administrator can be started by selecting *Settings* | *Control Panel* | *BDE Administrator* from the Windows start menu.

The Alias Manager dialog is opened from the menu item *Tools* | *Alias Manager...* and it is divided into two sections.
The upper part, as shown in Figure 5-3, is common for all database types.
The lower part contains individual settings for a specific database driver and is described later in this section.

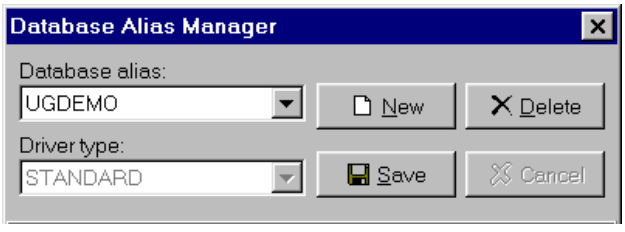


Figure 5-3

[9] Only filters that match the table structure in the *first* chosen table will be shown.
[10] If, for example, merging twelve-month tables into one-year table, then the 'January' table should be placed at top of the list box, then the 'February' table etc. That way the records in the new merged table will be listed in the correct date/time order.
[11] Only Paradox databases are supported as destination table.
[12] To use this functionality, the number of fields in the source tables must be less than the maximum number of allowed fields.

Alias Manager controls	
Database alias	Lists all aliases supported by the Alias Manager.
Driver type	Lists all database drivers available.

It is recommended to always use the STANDARD (Paradox) driver unless it is explicitly required to use another database driver.

5.3.1 Database driver settings

Paradox 7 (STANDARD driver)

Figure 5-4

Paradox 7 settings	
Database path	Defines the location (directory) where the tables are stored.

Oracle 8 (ORACLE driver)

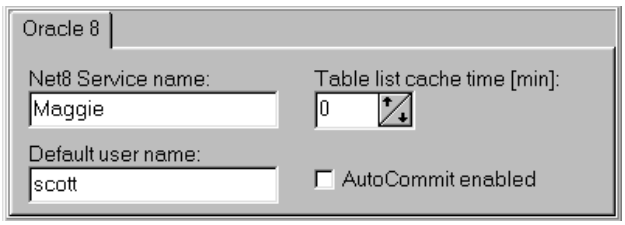


Figure 5-5

***Oracle 8* settings**	
Net8 Service name	Defines the Oracle Net8 service name. Must be defined in advance by using the appropriate Oracle tool.
Default user name	The default user name that is used, if automatic database login is disabled.
AutoCommit enabled	If enabled, the BDE automatically commit records to the table after each post. If disabled, the application decides when to commit the records. Please note that this setting is only relevant for applications that actually ***write*** to the database, like SmartLogger or SmartTranslator.
Table open list, cache time	Defines how long the table list is cached in memory. A new table list is not fetched from the database server until the cache time expires.

Possible cache time values:

Value	**Description**

-1	The table list is cached as long as the program is running. This should only be used for static databases, where no tables are added, after the program is started.
0	The table list is never cached. This will increase network traffic, as the table list is fetched directly from the database server every time it is requested.
>0	The table list is cached the number of minutes specified.

MS SQL Server 7/2000 (MSSQL driver)

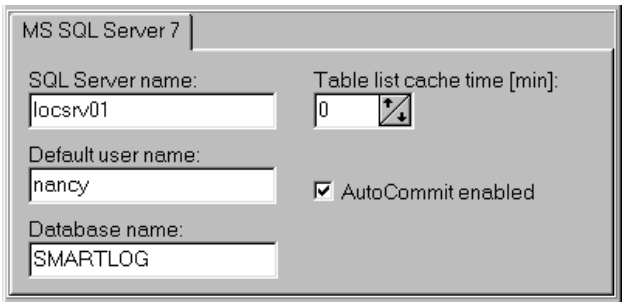


Figure 5-6

***MS SQL Server 7/2000* settings**	
SQL Server name	The registered name of the SQL Server where the database is running. Using the MS SQL Server Enterprise Manager, this registration can be performed.
Default user name	The default user name that is used, if automatic database login is disabled.
Database name	The name of the database containing the SmartLogger tables.
Table open list, cache time	Defines how long the table list is cached in memory. A new table list is not fetched from the database server before the cache time expires.
AutoCommit enabled	If enabled, the BDE automatically commit records to the table after each post. If disabled, the application decides when to commit the records. Please note that this setting is only relevant for applications that actually ***write*** to the database, like SmartLogger or SmartTranslator.

Possible cache time values:

Value	Description
-1	The table list is cached as long as the program is running. This should only be used for static databases, where no tables are added, after the program is started.
0	The table list is never cached. This will increase network traffic, as the table list is fetched directly from the database server every time it is requested.
>0	The table list is cached the number of minutes specified.

5.3.2 Standard alias operations

Create an alias

The following describes the procedure for creating a new standard alias.

1. Press the "New" button.
2. Type in the name for the new alias

3. Set driver type to "STANDARD".
4. Select the database path using the controls browse button.
5. Save the alias.

Modify an alias
To modify an alias, select the desired alias and change the settings applicable to that driver type.
To store the changes, press the save button.
If the settings are disabled, it is because the alias is currently in use and can therefore not be modified. This can also be verified by looking above the database alias where a red text with "(Active)" appears.
If the database driver has to be changed, you will have to create a new alias and delete the old one.

Delete an alias
To delete an alias, select the alias and press the delete button.
If the delete button is disabled, it is because the alias is in use and can therefore not be deleted.

Aliases that are currently in use cannot be modified or deleted.

5.3.3 Remote aliases

It is possible to let aliases point to locations on other computers in a network and thereby accessing databases located on remote computers. This feature is especially useful in configurations where multiple users (SmartClients) must access the same event tables generated by the SmartLogger/SmartTranslator.
The procedure for creating a remote alias is the same as for creating a local one. Just use the browse button to specify a network path instead of a local path.

When using remote aliases with Paradox databases the following must also be ensured

- The client computer must have full access to the network destination. I.e. the directory specified in the destination path must not be write protected.
- All BDE programs (SmartLogger, SmartClient) must use the same NET DIR path. This setting can be changed/verified from Control Panel | BDE Administrator | Configuration tab sheet | Drivers | Native | Paradox.

6 Quick Access Funktionality

The quick access functionality is a menu that pops up when right-clicking with the mouse anywhere in the table grid.

6.1 Copy to clipboard

The same functionality as described in section Copy selected records.

6.2 Field Customisation Panel

When selected, a panel is shown to the left of the table grid.

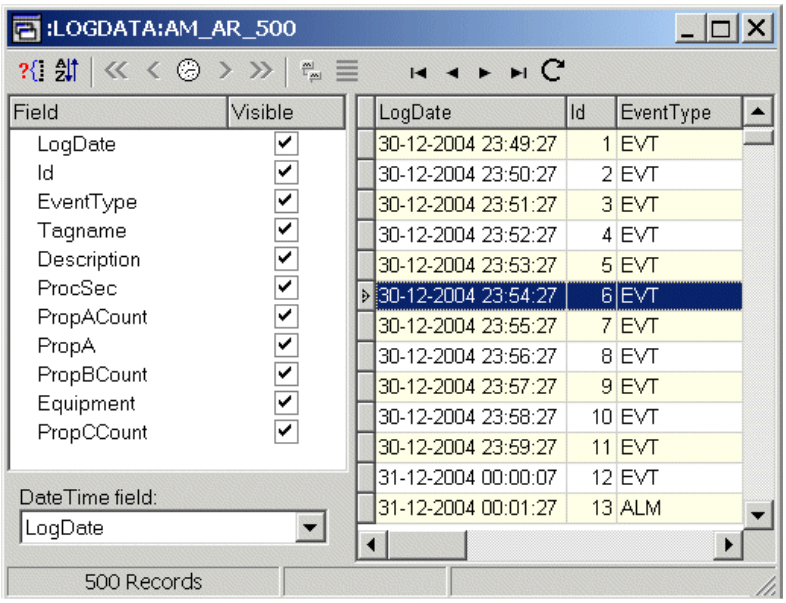


Figure 6-1

The Field Customisation Panel can be used to hide, show or rearrange the fields in the grid.
This is especially useful when irrelevant fields should be excluded from a printed report. The panel can also be used for specifying the DateTime field used for misc. time operations as explained in section Supported tables. This is relevant when a table contains more than one DateTime field.

> Fields can be dragged and dropped from the table grid to the panel and the other way around.

6.3 Export Selected/All Records

This feature is basically the same as the Table Export feature, described in section 5.1, except that:

- Only the selected records are exported if "Export selected" is chosen.
- TAB "characters" are always used as field separators for the Text export.

- To select more than one record, do one of the following:
- Press and hold down the SHIFT key while pressing the up/down key.
- Press and hold down the CTRL key while selecting records with the mouse.
- Select a record with the mouse, hold down the SHIFT key and select another record. All records in between these two selections will now be selected.

6.4 Print/Preview Selected/All

This feature is basically the same as the Print feature, described in section 3.4.

6.5 Grouping Mode

This feature allows all the data in the table grid to be grouped by any field specified by the user, as shown in Figure 6-2.
When grouping mode is activated, a grouping panel becomes visible just above the table grid.
To group by any field, simply drag the column header to this panel.
To remove a field from the grouping panel, simply drag the header back to the table grid.

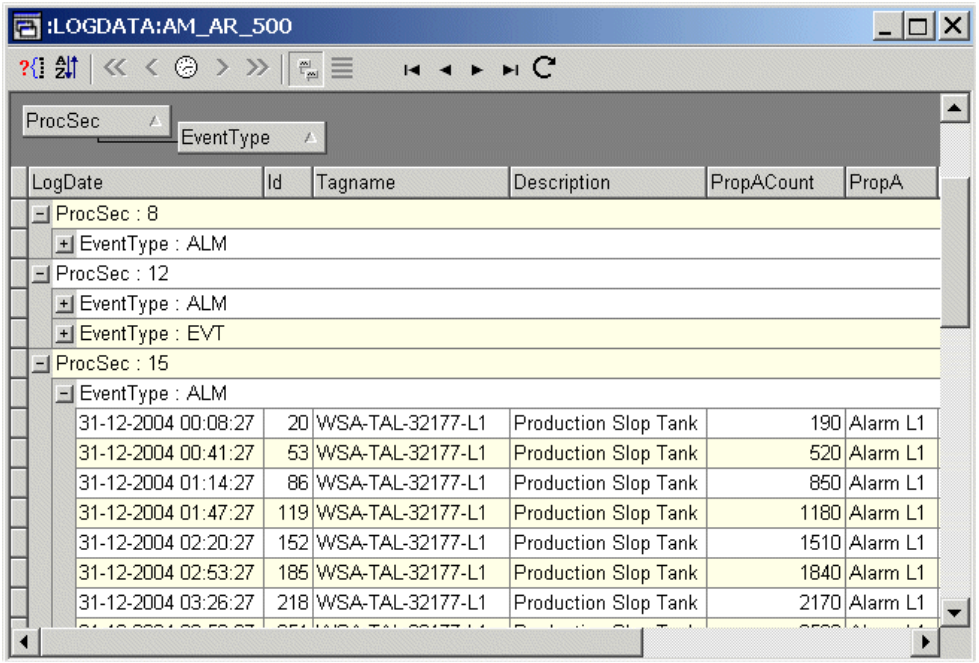

:LOGDATA:AM_AR_500
ProcSec
EventType
LogDate
Id
Tagname
Description
PropACount
PropA
ProcSec : 8
EventType : ALM
ProcSec : 12
EventType : ALM
EventType : EVT
ProcSec : 15
EventType : ALM
31-12-2004 00:08:27 20 WSA-TAL-32177-L1 Production Slop Tank 190 Alarm L1
31-12-2004 00:41:27 53 WSA-TAL-32177-L1 Production Slop Tank 520 Alarm L1
31-12-2004 01:14:27 86 WSA-TAL-32177-L1 Production Slop Tank 850 Alarm L1
31-12-2004 01:47:27 119 WSA-TAL-32177-L1 Production Slop Tank 1180 Alarm L1
31-12-2004 02:20:27 152 WSA-TAL-32177-L1 Production Slop Tank 1510 Alarm L1
31-12-2004 02:53:27 185 WSA-TAL-32177-L1 Production Slop Tank 1840 Alarm L1
31-12-2004 03:26:27 218 WSA-TAL-32177-L1 Production Slop Tank 2170 Alarm L1

Figure 6-2

> Grouping requires the grid to be in LoadAllRecords mode (refer to section LoadAllRecords Mode).

6.6 Quick Sorting Mode

This feature allows the user to sort the data in the grid without having to perform a SQL statement against the database server.
By clicking on the field headers, data in that field is sorted in ascending order. Clicking again reverses the sort order to descending.
When a field is sorted, a small up/down arrow appears to the right of the text in the field header as shown in Figure 6-3.

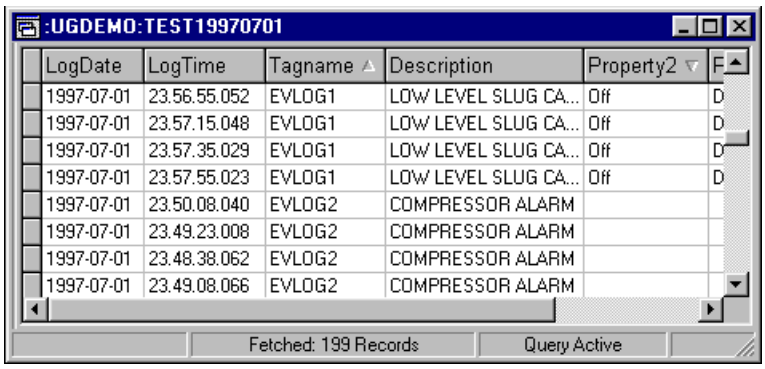


Figure 6-3

To sort by more than one field, hold down the <SHIFT> button on the keyboard and click on additional field headers with the mouse.

To remove the sorting of a field, hold down the <CTRL> button on the keyboard and click on field header that should be removed from the sorting.

Even though all sorting is removed, the data in the grid doesn't revert back to the state it had before the sorting began.
To show the data in the order it was before the sorting began, press the Refresh button in the toolbar.

> Quick Sorting requires the grid to be in LoadAllRecords mode (refer to section LoadAllRecords Mode).

6.7 Quick Filter

This feature allows the user to quickly filter data based on a specific field value without opening the SQL Query dialog.
The default filter values are set equal to the corresponding field values of the current selected record.

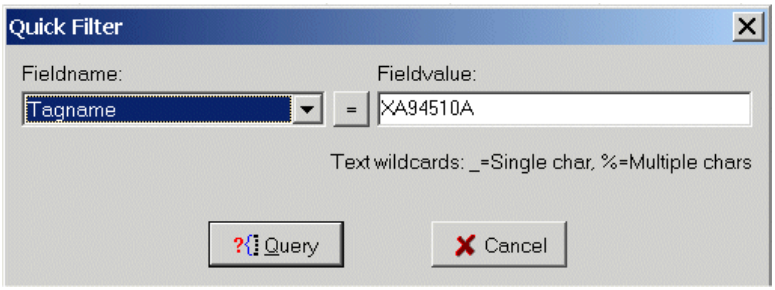


Figure 6-4

When changing the fieldname the default field value will be changed accordingly.
The filter will be added to any existing SQL filter and must be modified/removed via the SQL Query dialog (refer to section SQL Query).

7 Alarm Management (Add-on)

The Alarm Management module if part of the Analyze Tools add-on and is not included in the basic SmartClient package. The following descriptions only apply if this add-on has been purchased and registered on your system.

7.1 Before using the alarm management analysis

The different AM analyses have many configuration possibilities and can be used for many purposes.
To obtain both flexibility and usability, a number of advanced settings are auto-configured as default. It is therefore important to read this section carefully, in order to understand the behaviour of the analyses and to explore the full potential.

Take the "Alarm Frequency" analysis as an example. This analysis may seem quite straight forward, but can in fact be used for many different analyses, like:
- Alarm/Event frequency (Top 10, Top 20 etc.)
- Alarm frequency calculated per object (one object can generate many different alarms)
- Alarm type frequency (position errors, feedback error etc.)
- Alarm distribution between process areas

In general an analysis will analyze what is seen in the table view. This means that any filtering or time scope set for the table view is automatically applied to the analysis. This can be one or all of the following:
- BaseTime SQL (set when opening the table view)
- Time View limitations
- SQL Query limitations

If either Time View or SQL query settings are changed while the analysis dialog is open, this change will automatically be applied to the analysis, when it is run the next time.

7.1.1 Evaluating the analysis result

The analysis result view has up to four different views (tab sheets):

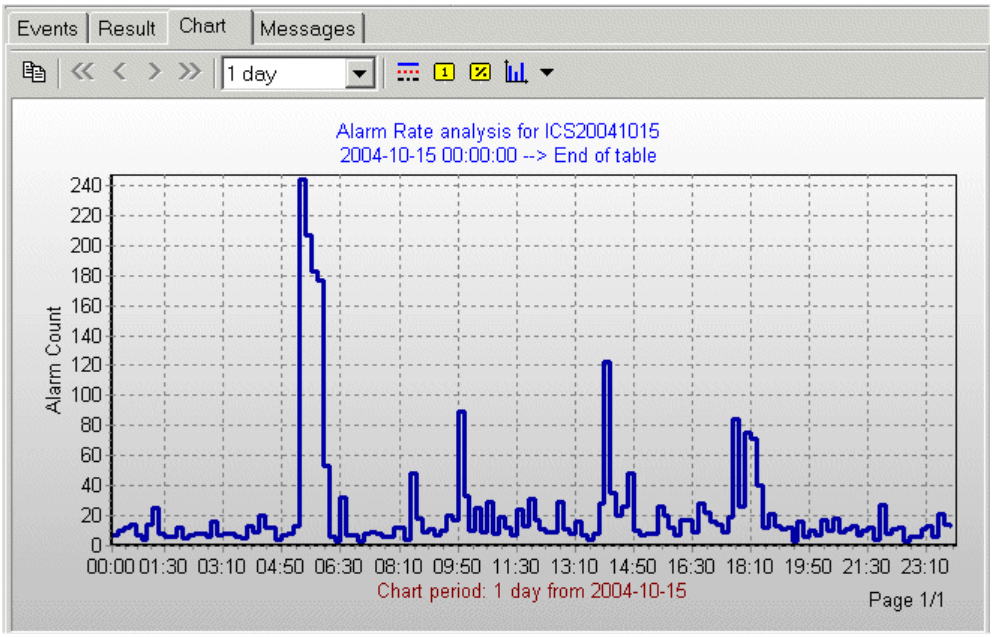


Figure 7-1

- **Events view**. Shows the events extracted from the data source and used for the analysis. This view can be used to document the data that the result is based on.
- **Result view**. Shows the result of the analysis. This data can be used for subsequent examination, export to Excel or similar.
- **Chart**. Graphical presentation of the analysis result.
- **Messages**. Trace messages and warnings related to the analysis. This can be used for fault tracing and examination of unexpected results.

7.2 Alarm Rate analysis

The alarm rate analysis is used to give an overview of the overall alarm rate compared to the EEMUA recommendation of 1 alarm per 10 minutes under normal conditions. Although this is an *alarm rate* analysis tool, it can also be used for other purposes as well. Depending on the initial settings it can be used for:

- Alarm/Event rate analysis
- Alarm peek detection
- Alarm rate analysis for specific process areas or process units

The following shows a typical set-up for an alarm rate analysis where the results can be compared to the EEMUA recommendation.

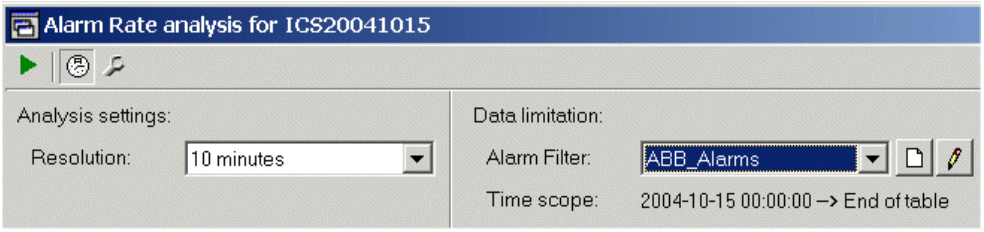


Figure 7-2

Analysis settings	
Resolution:	Specifies the alarm count resolution. If a 10 minutes resolution is selected then the number of alarms for each 10-minute interval is reported.
Data limitation	
Alarm filter:	Specifies the filter to be used on the data sources. If no filter is selected, the complete data source is analyzed. Refer to section Limiting the analysis data for creating or modifying filters.
Time scope:	This shows the actual time scope that will be used for the analysis. Refer to section Limiting the analysis period for information on changing the analysis period.

Pressing the "Execute" button starts the analysis and the final result will we be presented in a data grid and as a graphical presentation as shown below.

Grid presentation

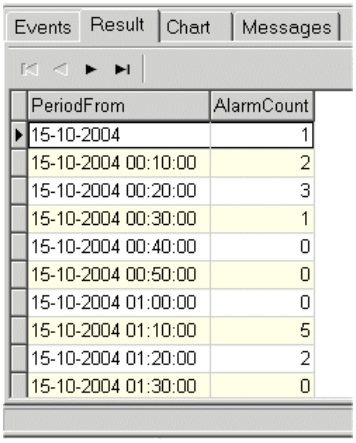


Figure 7-3

Each record in the data grid represents the alarm count for one resolution period.

Graphical presentation

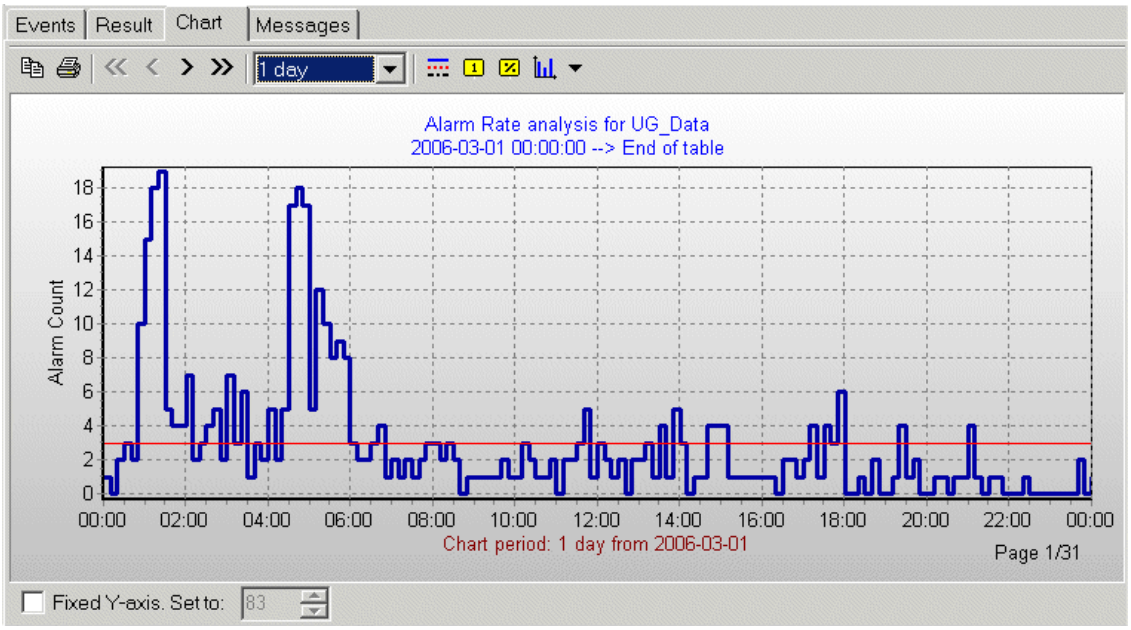


Figure 7-4

The graphical presentation shows the alarm rate compared to the recommended EEMUA rate, which is shown as a thin red line.

> According to EEMUA publication 191 the recommended average alarm rate during normal conditions should not exceed 1 alarm per 10-minutes.

7.3 Alarm Priority Distribution analysis

The alarm priority distribution analysis is used to benchmark or verify the alarm distribution for the available priority levels. EEMUA recommend a 80/15/5 distribution, which means that the alarm distribution should be about 80% warnings, 15% alarms and 5% critical alarms.
As for the other analysis types, this analysis can be used for other purposes as well depending on the initial set-up. This could be:

- Alarm distribution between plant sections
- Alarm distribution within specific modules or type circuits (by filtering on module and analysing on alarm type)

The following shows a typical set-up for an alarm priority distribution analysis.

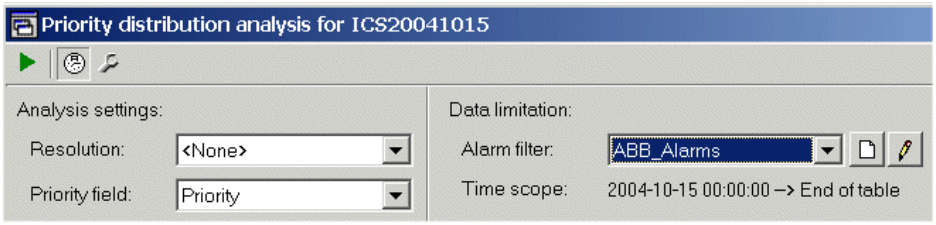


Figure 7-5

Analysis settings	
Resolution:	The analysis can be divided into time periods, like a day-based analysis for a complete month. When specified, the graphical presentation will have a corresponding number of pages.
Priority field: (Required)	Specifies the field in the table containing the priority identification.
Data limitation	
Alarm filter:	Specifies the filter to be used on the data sources. If no filter is selected then the complete data source is analyzed. Refer to section Limiting the analysis data for creating or modifying filters.
Time scope:	This shows the actual time scope that will be used for the analysis. Refer to section Limiting the analysis period for information on changing the analysis period.

Pressing the "Execute" button starts the analysis and the final result will be presented in a data grid and as a graphical presentation as shown below.

Grid presentation

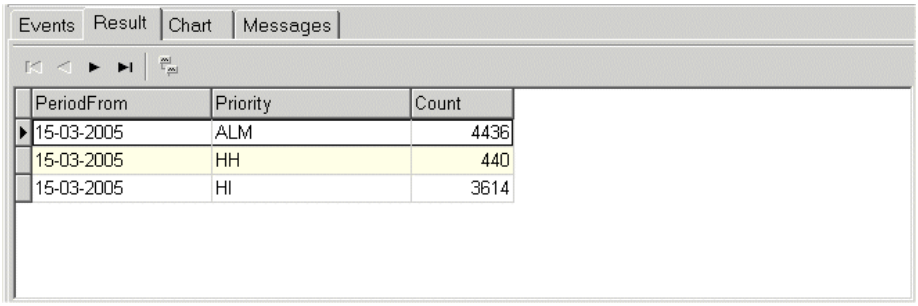


Figure 7-6

Column descriptions	
Period From:	Indicates the analysis period. Only relevant if a resolution has been selected.
Priority:	The priority value from the data source.
Count:	Alarm count for this period and priority.

Graphical presentation

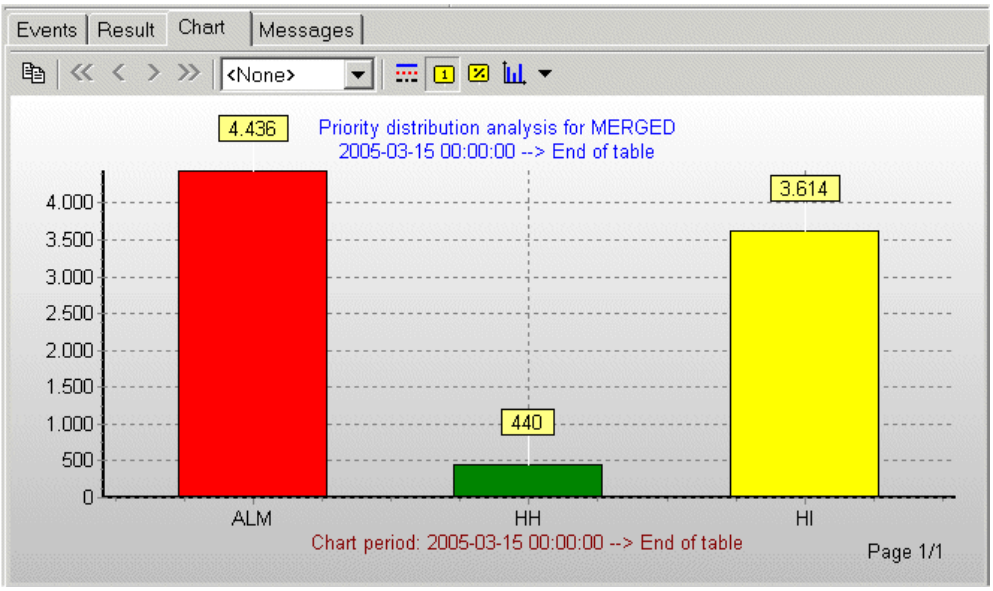


Figure 7-7

The graphical presentation shows the different priorities in overview.

7.4 Alarm Frequency analysis

The alarm frequency analysis is usually used to locate the top most alarms within any specified time period. Depending on the initial settings, it can be used for other purposes as well:

- Object alarm frequency analysis (see below)
- Alarm distribution in selected areas (process sections, event severities, event types etc.).

An alarm analysis typically looks at unique alarms. But some objects (like PID regulators) might generate many different alarms and these alarms might not be found in a standard analysis. By analysing only on the object name (tagname) another pattern could be found.

The following shows a typical set-up for an alarm frequency analysis.

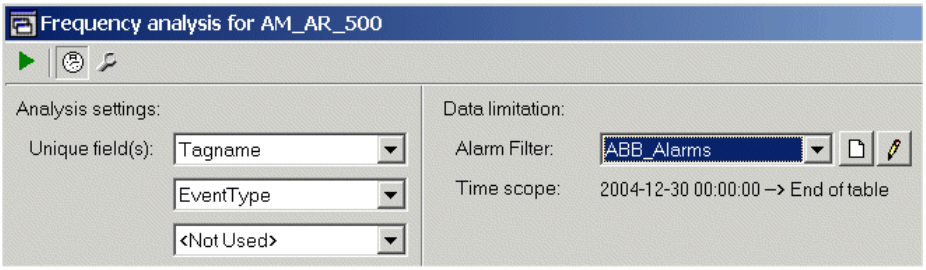


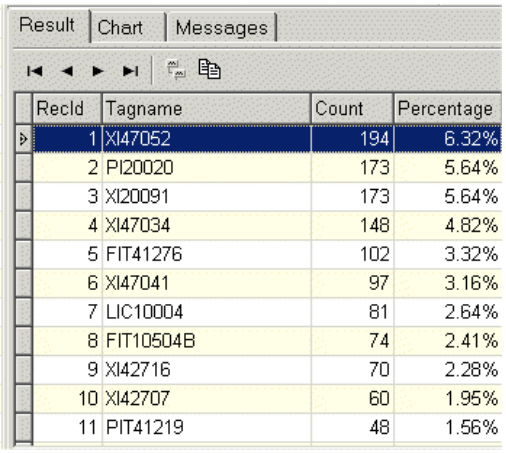
Figure 7-8

Analysis settings	
Unique fields:	Determines the fields to be analyzed.
Data limitation	
Alarm filter:	Specifies the filter to be used on the data sources. If no filter is selected, the complete data source is analyzed. Refer to section Limiting the analysis data for creating or modifying filters.

Time scope:	This shows the actual time scope that will be used for the analysis. Refer to section Limiting the analysis period for information on changing the analysis period.

Pressing the "Execute" button starts the analysis and the final result will we be presented in a data grid and as a graphical presentation as shown below.

Grid presentation



RecId	Tagname	Count	Percentage
1	XI47052	194	6.32%
2	PI20020	173	5.64%
3	XI20091	173	5.64%
4	XI47034	148	4.82%
5	FIT41276	102	3.32%
6	XI47041	97	3.16%
7	LIC10004	81	2.64%
8	FIT10504B	74	2.41%
9	XI42716	70	2.28%
10	XI42707	60	1.95%
11	PIT41219	48	1.56%

Figure 7-9

Each row in the result grid represents one unique alarm or alarm type depending on the analysis settings. For each row the total number of occurrences (count) and the percentage load from this item is shown. The percentage load is calculated as ("Count" divided by "Total alarms") * 100%.

Graphical presentation

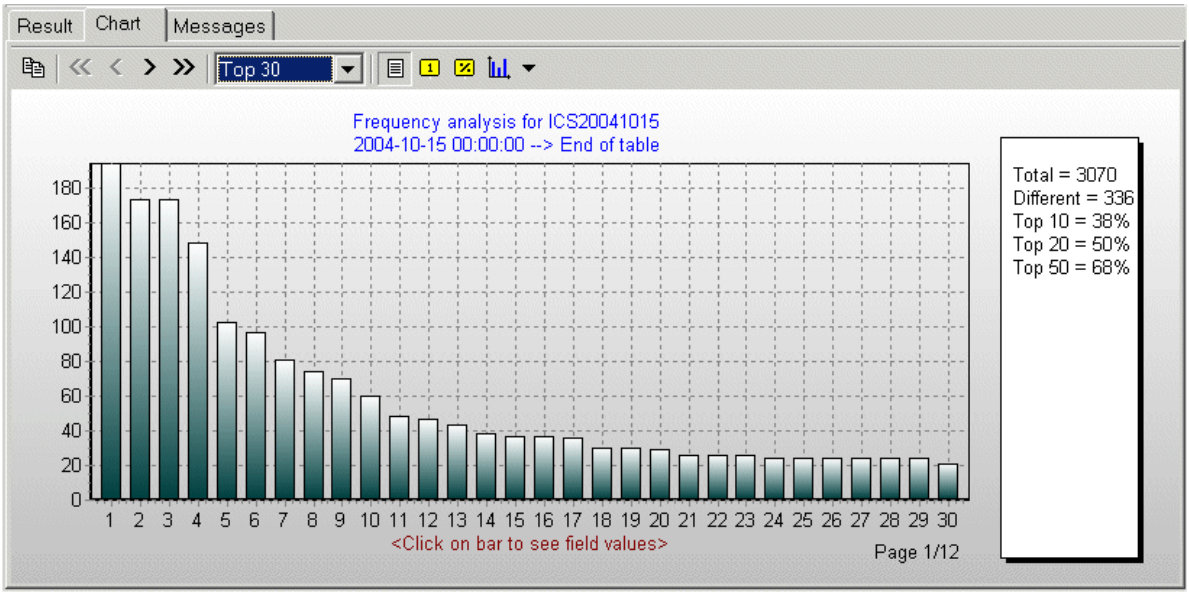


Figure 7-10

The graphical presentation shows the chosen "Top XX" alarms. The number of bars to be shown per page can be selected from the drop-down control on the toolbar.
Clicking on a bar will show the object the bar represents.
The textbox to the right shows a number of benchmark figures:

Total: The total number of alarms found in the data source.
Different: Number of different alarms found.
Top 10: Alarm load in percent from top 10 alarms.
Top 20: Alarm load in percent from top 20 alarms.
Top 50: Alarm load in percent from top 50 alarms.

7.5 Operator Response Time (ORT) analysis

The operator response time is defined as the time from an alarm arises until the operator performs an acknowledgement. The Operator Response Time analysis measures the response times for all alarms over a certain period of time. If there are many situations where the operator has too long response times, this indicates a potential alarm management problem.

In order to execute the ORT analysis an *alarm filter* and an *acknowledgement filter* must be defined.

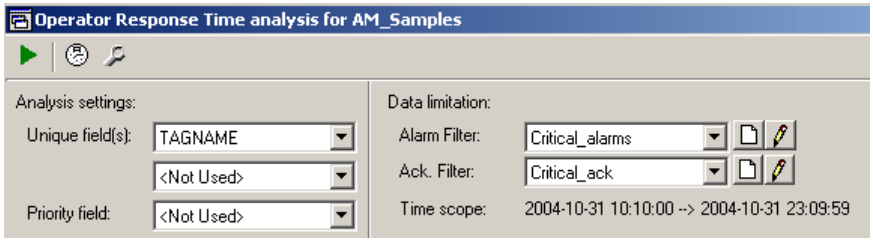
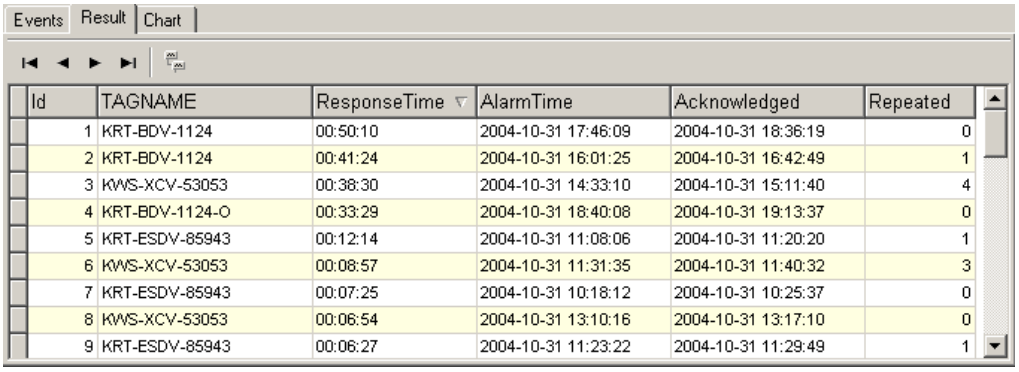


Figure 7-11

Analysis settings	
Unique fields:	The analysis must pair together records returned from the two selected filters. For that purpose one or more reference fields that makes the event unique is needed. Many system vendors have a "Tagname" or "Objectname" reference that will be sufficient, but in some cases additional selections are required.
Priority:	A priority field is not needed for the analysis, but can be useful information when looking at the analysis result. Long response times on warnings might be acceptable, while long response times on critical alarms can be a serious problem.
Data limitation	
Alarm filter:	Specifies the filter that identifies the alarm "on" conditions.
Ack. Filter:	Specifies the filter that identifies the operator acknowledgements.
Time scope:	This shows the actual time scope that will be used for the analysis. Refer to section Limiting the analysis period for information on changing the analysis period.

Pressing the "Execute" button starts the analysis and the final result will we be presented in a data grid and as a graphical presentation as shown below.

Grid presentation



Id	TAGNAME	ResponseTime	AlarmTime	Acknowledged	Repeated
1	KRT-BDV-1124	00:50:10	2004-10-31 17:46:09	2004-10-31 18:36:19	0
2	KRT-BDV-1124	00:41:24	2004-10-31 16:01:25	2004-10-31 16:42:49	1
3	KWS-XCV-53053	00:38:30	2004-10-31 14:33:10	2004-10-31 15:11:40	4
4	KRT-BDV-1124-O	00:33:29	2004-10-31 18:40:08	2004-10-31 19:13:37	0
5	KRT-ESDV-85943	00:12:14	2004-10-31 11:08:06	2004-10-31 11:20:20	1
6	KWS-XCV-53053	00:08:57	2004-10-31 11:31:35	2004-10-31 11:40:32	3
7	KRT-ESDV-85943	00:07:25	2004-10-31 10:18:12	2004-10-31 10:25:37	0
8	KWS-XCV-53053	00:06:54	2004-10-31 13:10:16	2004-10-31 13:17:10	0
9	KRT-ESDV-85943	00:06:27	2004-10-31 11:23:22	2004-10-31 11:29:49	1

Figure 7-12

Column descriptions	
Id:	Sequential number
<TAGNAME>	This field is equal to the field(s) selected when setting up the analysis. If more fields were selected more columns would be shown here.
Response Time:	Time between alarm time and acknowledgement time.
Alarm Time:	Time when the alarm occurred. If empty no corresponding alarm was found.
Acknowledged:	Time when the alarm was acknowledged. If empty no corresponding acknowledge event was found.
Repeated:	Shows how many times the alarm was repeated before it was acknowledged.

Each row in the grid represents an alarm with a corresponding acknowledgement action.

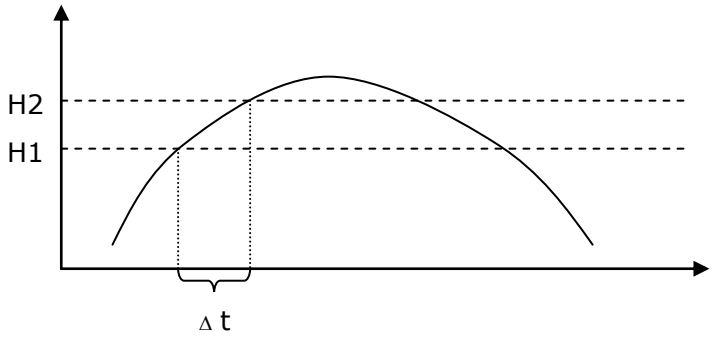
7.6 Reaction Time analysis

For transmitters and controlling loops the time from a H1 alarm to a H2 alarm can be described as the *Operator Reaction Time*. I.e. the time from a pre-warning before a more serious alarm occur.

It is important that the H1 alarm comes in time, so that the operator has the necessary time to perform relevant corrections and preventive actions. The recommended minimum reaction time varies from process to process and from loop to loop. For generic analyses it would typically be in the area from 2 to 5 minutes.
The AM Reaction Time analysis can be used to evaluate the reaction times and help to locate:

- Tags with identical set-points
- Tags with high rate of too short reaction times
- Tags with scattering alarms in H2 mode

In the following figure the Operator Reaction time is shown as delta t (Δt):



In order to execute the Reaction Time analysis a *pre-warning filter* and an *Alarm/Trip filter* must be defined.

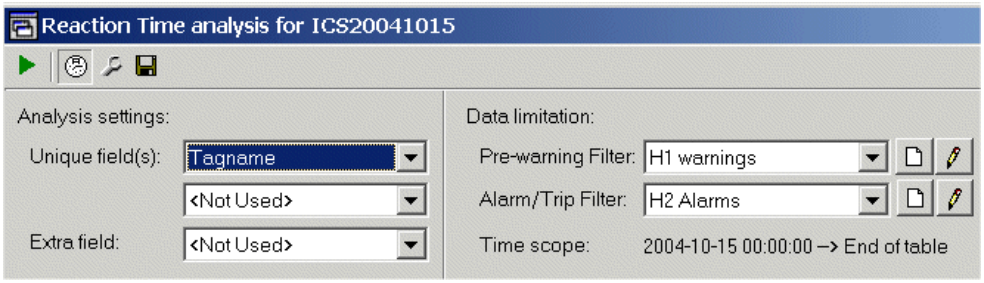
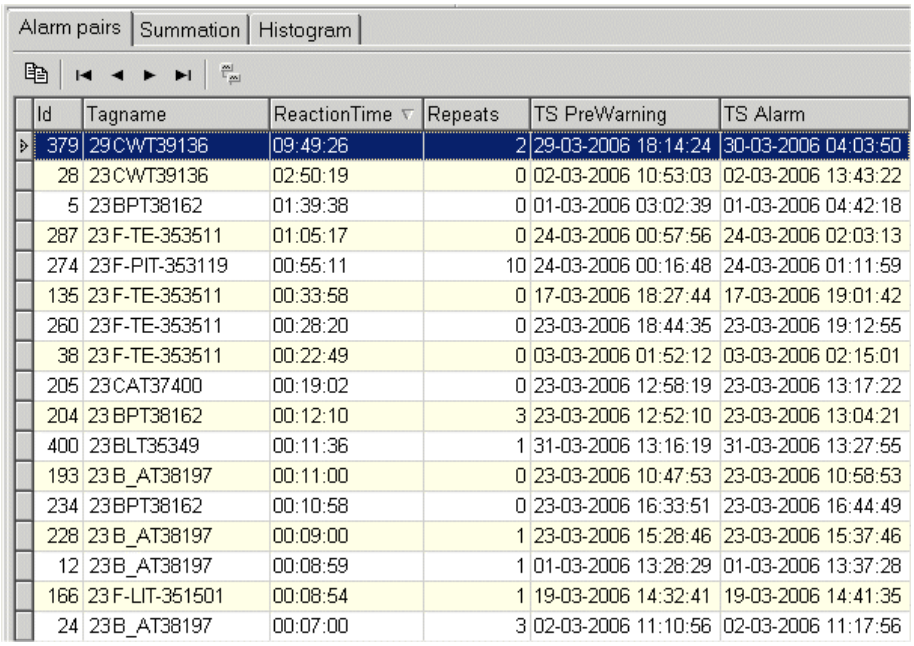


Figure 7-13

Analysis settings	
Unique fields:	The analysis must pair together records returned from the two selected filters. For that purpose one or more reference fields that makes the event unique is needed. Many system vendors have a "Tagname" or "Objectname" reference that will be sufficient, but in some cases additional selections are required.
Extra field:	This setting is not required for the analysis, but might add valuable information to the result lists. If for example a "Description" field is available then this field can be chosen and informative texts will be added to the tagname references.
Data limitation	
Pre-warning filter:	Specifies the filter that identifies the pre-warning alarms, typical H1/Hi or L1/Lo alarms.
Alarm/Trip filter:	Specifies the filter that identifies the trip alarms, typical H2/HiHi or L2/LoLo alarms.
Time scope:	This shows the actual time scope that will be used for the analysis. Refer to section Limiting the analysis period for information on changing the analysis period.

Pressing the "Execute" button starts the analysis and the final result will we be presented in a data as shown below:

Grid presentation (alarm pairs)

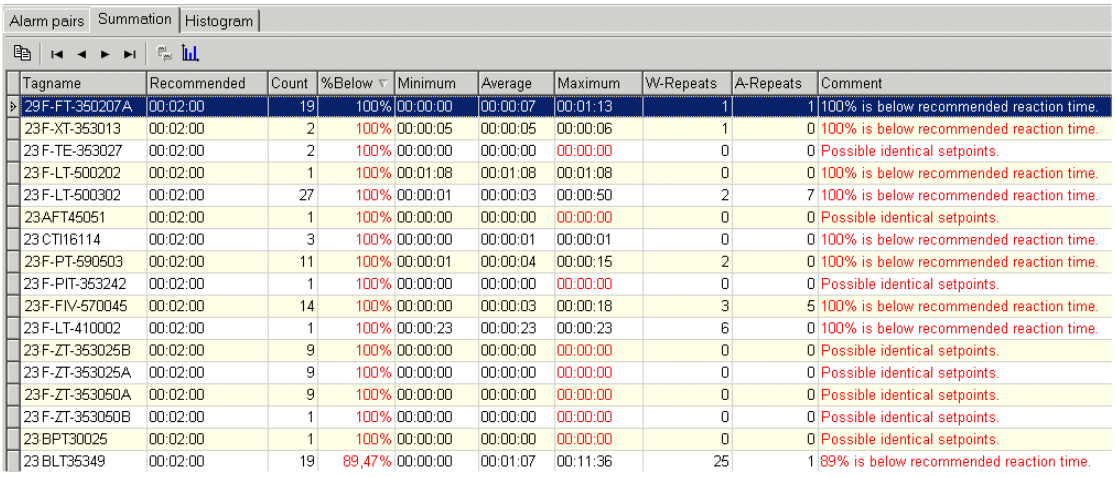


Id	Tagname	ReactionTime	Repeats	TS PreWarning	TS Alarm
379	29CWT39136	09:49:26	2	29-03-2006 18:14:24	30-03-2006 04:03:50
28	23CWT39136	02:50:19	0	02-03-2006 10:53:03	02-03-2006 13:43:22
5	23BPT38162	01:39:38	0	01-03-2006 03:02:39	01-03-2006 04:42:18
287	23F-TE-353511	01:05:17	0	24-03-2006 00:57:56	24-03-2006 02:03:13
274	23F-PIT-353119	00:55:11	10	24-03-2006 00:16:48	24-03-2006 01:11:59
135	23F-TE-353511	00:33:58	0	17-03-2006 18:27:44	17-03-2006 19:01:42
260	23F-TE-353511	00:28:20	0	23-03-2006 18:44:35	23-03-2006 19:12:55
38	23F-TE-353511	00:22:49	0	03-03-2006 01:52:12	03-03-2006 02:15:01
205	23CAT37400	00:19:02	0	23-03-2006 12:58:19	23-03-2006 13:17:22
204	23BPT38162	00:12:10	3	23-03-2006 12:52:10	23-03-2006 13:04:21
400	23BLT35349	00:11:36	1	31-03-2006 13:16:19	31-03-2006 13:27:55
193	23B_AT38197	00:11:00	0	23-03-2006 10:47:53	23-03-2006 10:58:53
234	23BPT38162	00:10:58	0	23-03-2006 16:33:51	23-03-2006 16:44:49
228	23B_AT38197	00:09:00	1	23-03-2006 15:28:46	23-03-2006 15:37:46
12	23B_AT38197	00:08:59	1	01-03-2006 13:28:29	01-03-2006 13:37:28
166	23F-LIT-351501	00:08:54	1	19-03-2006 14:32:41	19-03-2006 14:41:35
24	23B_AT38197	00:07:00	3	02-03-2006 11:10:56	02-03-2006 11:17:56

Figure 7-14

Column descriptions	
Id:	Sequential number
<TAGNAME>	This field is equal to the field(s) selected when setting up the analysis. If more fields were selected, more columns would be shown here.
Reaction Time:	Time between pre-warning time and trip/alarm time. If more pre-warnings were found, time is calculated from the latest pre-warning.
Repeats:	Number of pre-warnings occurred before alarm/trip occurred.
TS PreWarning:	Time when the pre-warning occurred. If empty no corresponding pre-warning was found.
TS Alarm:	Time when the alarm/trip occurred. If empty no corresponding alarm was found.

Grid presentation (summation)



Tagname	Recommended	Count	%Below	Minimum	Average	Maximum	W-Repeats	A-Repeats	Comment
29F-FT-350207A	00:02:00	19	100%	00:00:00	00:00:07	00:01:13	1	1	100% is below recommended reaction time.
23F-XT-353013	00:02:00	2	100%	00:00:05	00:00:05	00:00:06	1	0	100% is below recommended reaction time.
23F-TE-353027	00:02:00	2	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23F-LT-500202	00:02:00	1	100%	00:01:08	00:01:08	00:01:08	0	0	100% is below recommended reaction time.
23F-LT-500302	00:02:00	27	100%	00:00:01	00:00:03	00:00:50	2	7	100% is below recommended reaction time.
23AFT45051	00:02:00	1	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23CTI16114	00:02:00	3	100%	00:00:00	00:00:01	00:00:01	0	0	100% is below recommended reaction time.
23F-PT-590503	00:02:00	11	100%	00:00:01	00:00:04	00:00:15	2	0	100% is below recommended reaction time.
23F-PIT-353242	00:02:00	1	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23F-FIV-570045	00:02:00	14	100%	00:00:00	00:00:03	00:00:18	3	5	100% is below recommended reaction time.
23F-LT-410002	00:02:00	1	100%	00:00:23	00:00:23	00:00:23	6	0	100% is below recommended reaction time.
23F-ZT-353025B	00:02:00	9	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23F-ZT-353025A	00:02:00	9	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23F-ZT-353050A	00:02:00	9	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23F-ZT-353050B	00:02:00	1	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23BPT30025	00:02:00	1	100%	00:00:00	00:00:00	00:00:00	0	0	Possible identical setpoints.
23BLT35349	00:02:00	19	89,47%	00:00:00	00:01:07	00:11:36	25	1	89% is below recommended reaction time.

Figure 7-15

The summation tab summarizes all alarm pairs for each individual tagname. Only completed alarm pairs (where both a pre-warning and an alarm/trip event were found) are included in the calculation.

Column descriptions	
<TAGNAME>	This field is equal to the field(s) selected when setting up the analysis. If more fields were selected more columns would be shown here.
Recommended:	Shows the *Recommended minimum reaction time* used for this analysis. The value can be changed from the analysis options dialog (refer to section AM Options)
Count:	Number of alarms pairs found for this tag.
%Below:	Number of alarm pairs in percentage where the *reaction time* was below the *recommended minimum time.*
Minimum:	The minimum reaction time found.
Average:	The average reaction time for all alarm pairs.
Maximum:	The maximum reaction time found.
W-repeats:	The total number of pre-warnings found. A low W-Repeats/Count ratio indicates improper alarm set-points.
A-repeats:	Number of alarms in Alarm/Trip mode (repeating H2 alarms). A high A-repeats/Count ratio indicates scattering alarm in Alarm/Trip mode.
Comment:	Supplementary auto generated descriptions about possible bad actors.

Histogram (for selected tag)
Pressing the "Histogram" button a graphical presentation of the reaction times (for the selected tag) is shown:

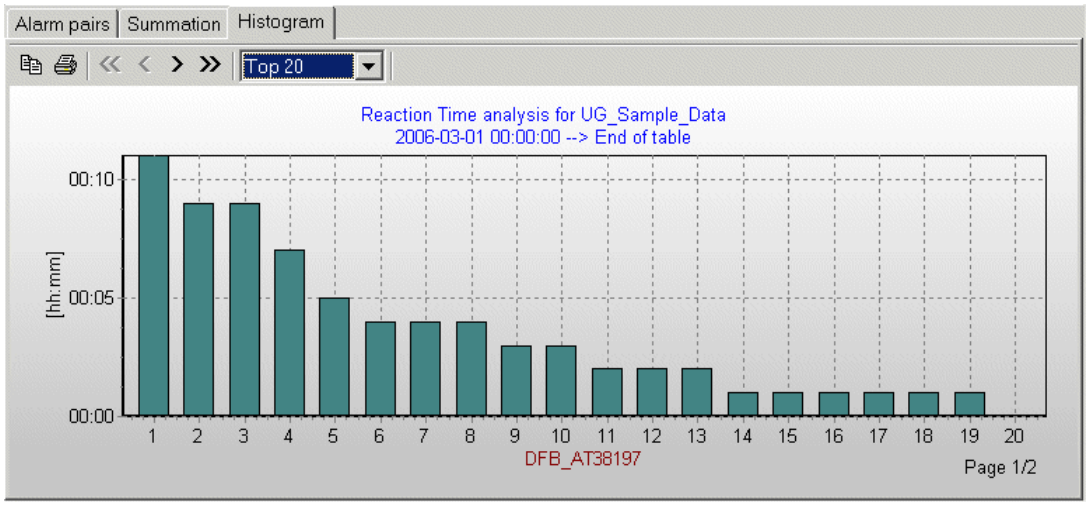


Figure 7-16

7.7 Common AM Options

7.7.1 Limiting the analysis period

The selected time scope for the analysis is shown on the analysis dialog:

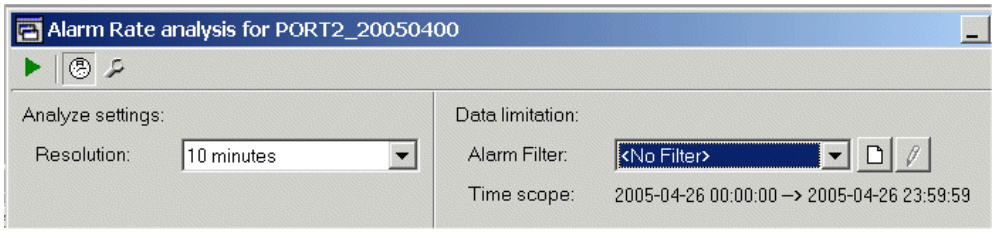


Figure 7-17

To change it, go to the table view and change the current Time View for the table view. In some cases the time scope shown on the analysis dialog will be slightly different than the Time View settings. This is due to the *auto-scale* functionality that will try to find the best time scope according to the selected resolution. An adjustment will typically happen if the selected time scope starts or stops at an odd time, like for example a start time at 00:11:53. The *auto-scale* function will then change the start time to 00:00:00. Auto-scaling can be enabled/disabled on the analysis toolbar.

7.7.2 Limiting the analysis data

Any SQL queries applied to the data source will be automatically applied to the analysis. To change a query, go back to the table view and change the SQL Query settings (refer to section SQL Query).
In addition to the standard queries, an additional filtering can be applied from the analysis dialog. This filter is optional, except for the Operator Response Time analysis where the filters are used to determine the event types. All filter controls have a *New Filter* and a *Modify Filter* button as shown in Figure 7-18.

Figure 7-18

When pressing either one of the two buttons, the filter dialog will be shown:

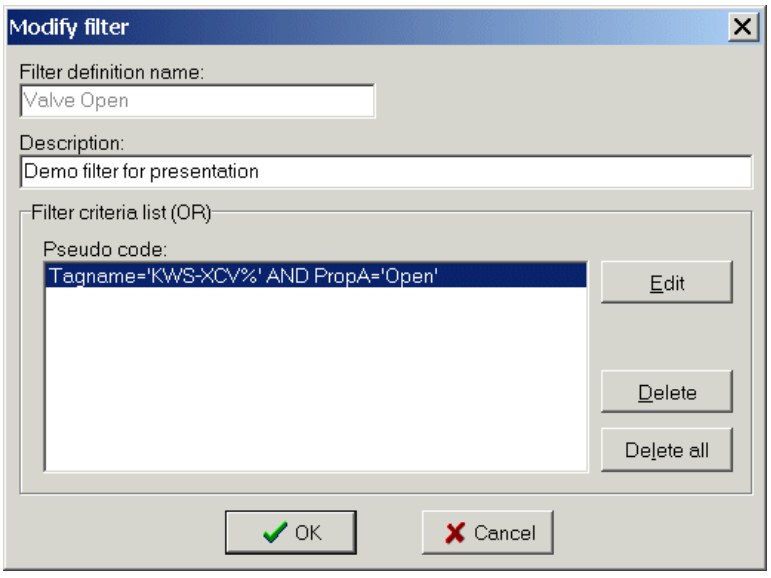


Figure 7-19

New Filter or Modify Filter	
Filter definition name:	Filter name[13].
Description:	Optional information about the filter.
Filter criteria list	
Pseudo code:	Lists the query definition in pseudo code. Each line represents a filter criterion. All filter criteria are "OR'ed" together in the final SQL statement.
Edit button:	Opens the standard SQL Query dialog for editing query definitions as described in section SQL Query.
Delete button:	Deletes the selected OR criteria from the pseudo code list.
Delete all button:	Deletes all criteria.

7.7.3 AM Options

By pressing the options icon on the AM toolbar options, as shown in Figure 7-20, can be set:

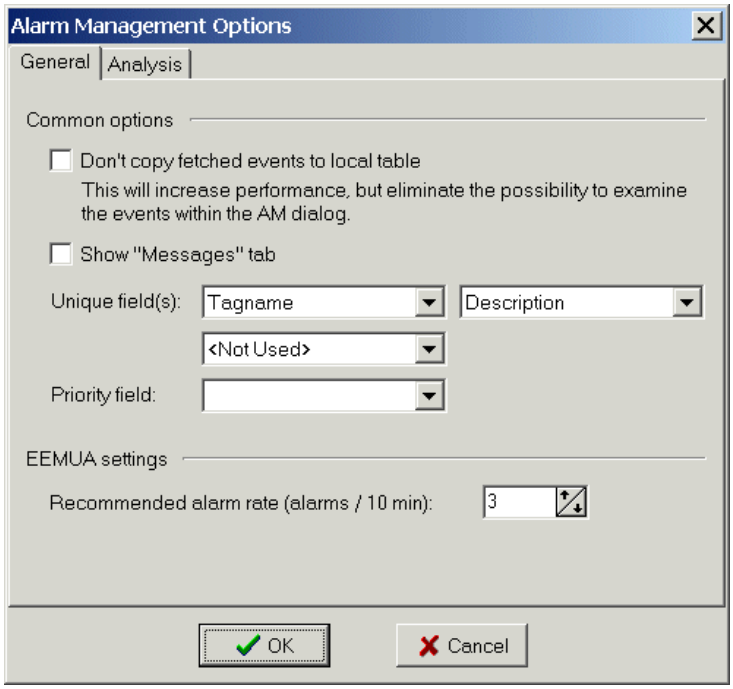


Figure 7-20

Common options	
Don't copy fetched…	As default, a copy of the fetched events will be stored locally in the TEMPDATA alias. When working with a large amount of source data, this setting can be used to increase performance. When enabled, the Events view, as mentioned earlier, will not contain any events.
Show "Messages" tab	If enabled, a "Messages" tab is shown containing all runtime messages for the analysis. This should only be used in case of unexplainable errors in the analysis result.
Unique field(s) / Priority field	Default selections for analysis using these kind of fields.
EEMUA settings	

[13] The filter name can only be set when creating a new filter. It cannot be modified later on, like the rest of the information set for that filter.

Recommended alarm rate:	This is used for the graphical presentation in the alarm rate analysis and shows a red line that should not be exceeded..

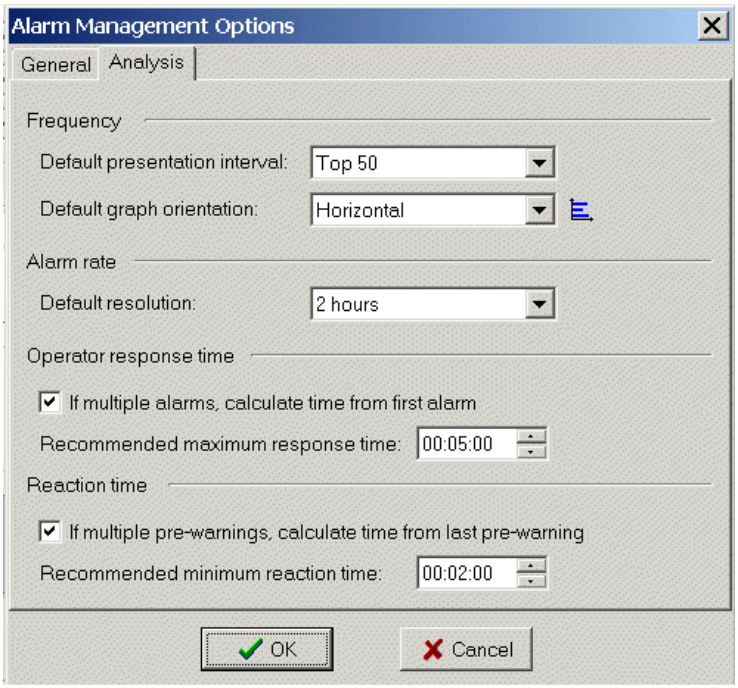


Figure 7-21

Frequency & Alarm rate	
Default…	Default selections used when the corresponding analysis is opened.
Operator Response Time	
If multiple alarms...	Should normally be checked.
Recommended maximum…	For future use.
Reaction Time	
If multiple pre-warnings...	Determines which pre-warning to use in case of multiple pre-warnings. Should normally be checked.
Recommended minimum…	Used for alarm summation calculations. Alarm pairs with reaction times less than *recommended minimum reaction time* are included in the "% Below" value. Refer to section Reaction Time analysis for more details.

7.8 Analyze Time

Analyze Time is a tool for calculating elapsed time between two specific events and is a part of the Analyze Tools add-on.

In the SmartClient terminology the two events used for calculating elapsed times, are called an ON criterion and an OFF criterion.

In the process industry this Analyze Time function can be used for many different purposes, like calculating:

- How many times a certain pump has performed a start/stop cycle.

- How many times a certain valve has gone from open to close.
- The total running time for a pump.
- The min/avg./max running time for a pump.
- The min/avg./max travel time for the valve.

In addition to this, the Analyze Time module will detect signal "flicker", if one of the analyzed objects has this problem.
Signal flicker can occur, if there, for example, is a bad connection in a valve's closing switch, so that the switch generates two events every time valve is closed.

The Analyze Time configuration dialog (shown in Figure 7-22) can be opened by choosing *Analyze* | *Time* | *Config/Run* from the menu.

A configured analysis can be saved to disk. The file saved is called an Analyze Time template, and describes all objects (pumps, valves etc.) and analysis settings for one analysis.

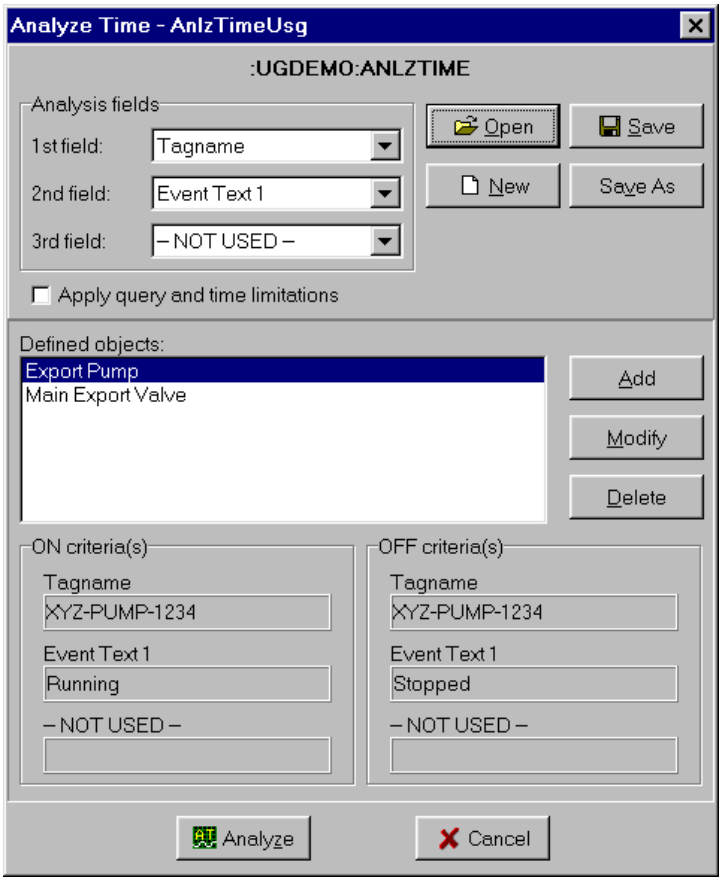


Figure 7-22

7.8.1 Designing an analysis

In order to perform an analysis, the following must be specified:

1. The fields to include in the analysis in order to make an event unique.
2. Whether the analysis should be performed on the entire table or only on the records limited by any query or time view settings. If the analysis must be performed on the entire table, the checkbox labelled "*Apply query and time limitations*" must be **un**checked.
3. Any number of objects with corresponding ON and OFF criteria's.

Example - Add object manually
In the table below there are 4 events, each with different properties in the fields: **Tagname**, **EventText1** and **EventText2**.

Tagname	EventText1	EventText2
XYZ-PUMP-1234	Running	
XYZ-PUMP-1234	Failure	Motor
XYZ-PUMP-1234	Failure	Shutdown
XYZ-PUMP-1234	Stopped	

If you, for example, want to analyze the time that the pump has been running (the time between *Running* and *Stopped* in **EventText1**), then you must configure the analysis for using both the **Tagname** and the **EventText1** fields.
It would not be enough just to use one field, **Tagname**, in the analysis, as this would also inadvertently include the *Failure* events.

You will then have to add an "object" to the analysis as shown in Figure 7-23.

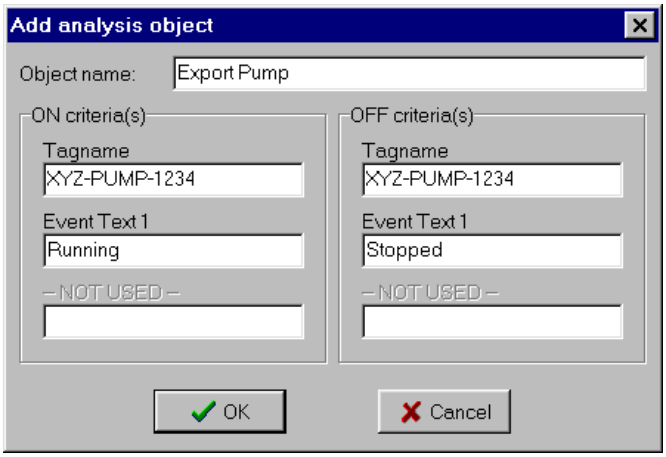


Figure 7-23

In this case, we have given the pump XYZ-PUMP-1234 the more explanatory object name "Export Pump".

Example - Add object by drag n' drop
An easier way to add objects is to drag two records (an ON and an OFF criteria) from the table and directly into the Analyze Time dialog. When dropped onto the "Defined objects" list box a new object is automatically created.

Adding the same object with the same information, as specified in the previous example, would be performed like this:
- Select the 2 records that can be used as ON/OFF criteria's in the table grid. In this case we will use the same records as used in the previous example above.
- Drag these records to the Analyze Time dialog and drop them onto the list box.

A dialog, as shown in Figure 7-24, should now appear.

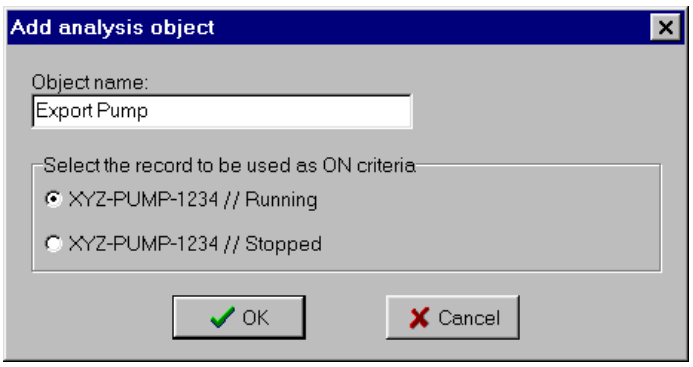


Figure 7-24

- Specify the object name: Export Pump.
- Select which one of the records that should be used as the ON criteria (in this case the one already selected).
- Press OK.

It is possible to add an unlimited number of objects to an analysis, as long as they all use the same fields. I.e. it is not allowed to have one object using the fields **Tagname** and **EventText1** and another using the fields **Tagname** and **EventText2**.

> The ON/OFF criteria's are case sensitive, i.e. an event containing **EventText1 =** *Running* is not considered the same as **EventText1 =** *running.*

7.8.2 Running an analysis

When all objects are defined, the template can be saved and the analysis can be executed.
During execution of the analysis an Execution Status dialog, as shown in Figure 7-25, will be presented.
From this dialog the progress of the analysis can be monitored, and the analysis can be stopped at any time by clicking the **Stop** button.
The **Close** button shown in Figure 7-25 will change to a **Stop** button during the analysis.

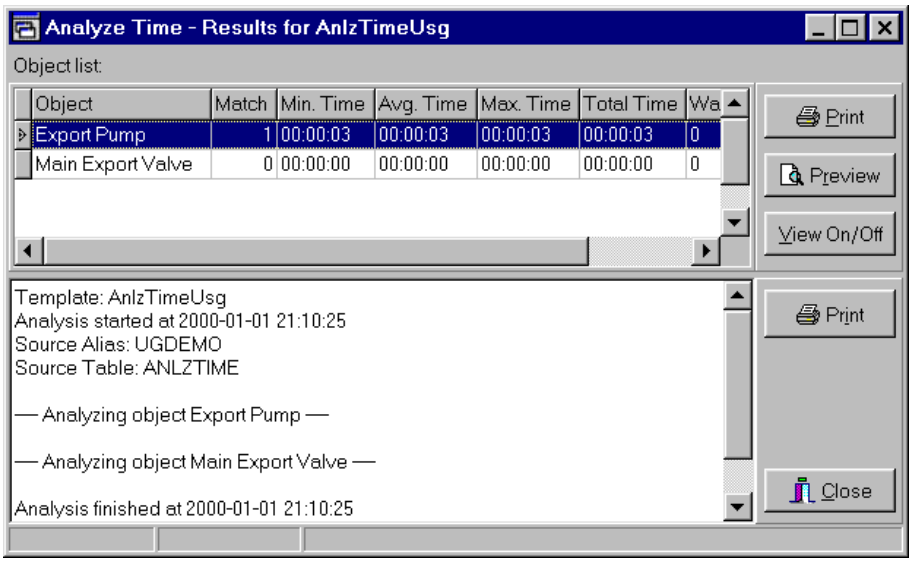


Figure 7-25

The analysis status dialog is divided into two parts.

At the top you have the object list, containing the status for each of the objects configured for the current analysis template.
At the bottom all the runtime messages that the analysis generates are listed.

Object list section
The object list grid has the following fields:

Field	Description
Object	The name of the analysis object.
Match	The number of ON/OFF pairs found for the specified object.
Min. Time	The shortest time found between any ON/OFF pair.
Avg. Time	Average time between all ON/OFF pairs.
Max. Time	The longest time found between any ON/OFF pair.
Tot. Time	The accumulated time for all ON/OFF pairs
Warnings	The number of warnings generated for the object.
Status	*Pending* = waiting for calculation, *Calculating* = currently calculating times, *Done* = analysis for this object is finished.

The results can be printed using the **Print** or the (**Print**) **Preview** button to the right of the grid.

During the analysis the SmartClient creates a separate table that contains all ON/OFF pairs. This table is named **<Analysis name>_ALL**, and can be opened just like any other SmartLogger table. Pressing the **View On/Off** button will open the table and at the same time minimize the Execution Status dialog.

Runtime messages section
All relevant status information, warnings and errors are listed in the message window. The information is written to an analysis log, when the analysis is finished. The log file is named **<Analysis name>.atr**.

The runtime messages can be printed using the **Print** button located to the right of the message window.

Analysis files
The following files are generated during an analysis:

File name	Description
<Name>.azt	The analysis template.
<Name>.atr	The analysis log.
<Name>_RES.db	The results of the analysis (database table).
<Name>_ALL.db	All ON/OFF pairs of the analysis (database table).

<Name> is the name of the template.

The template file is located in the *<Programpath>\AnalyzeTime* directory, while the other files are located in the directory specified by the ANLZTIME alias. As default, the ANLZTIME alias points to the *<Programpath>\AnalyzeTime\Data* directory.

Do not edit, modify or delete any of these files by yourself. All configurations must be done with the SmartClient's Analyze Time tool.

7.8.3 Exporting results

By right clicking with the mouse anywhere in the result grid, it is possible to export some or all of the results to another format. The results can be copied to the clipboard or exported to Text, MS Excel, HTML or XML files.

7.8.4 Loading an analysis result

It is possible to load, view and/or print an analysis performed earlier.
If the menu item *Analyze* | *Time* | *Load Result* is selected, an Analyze Time result file can be re-opened.
The same actions can be performed with this "old" analysis as with an analysis just executed.

The result table can also be opened and viewed like any other table. The result table will, like other SmartLogger tables, contain a "LogDate" field. For all entries in the result table, the "LogDate" field will contain the Date/Time when the analysis was started.

8 Appendix

8.1 Grid modes

The table grid works in two different modes dependent of the operation chosen by the user. The different modes are described in this section.

8.1.1 Normal Mode

This is the default mode of the grid when a table is initially opened.
Only the records visible in the grid are loaded into memory. When scrolling through the table, the records that become "out of sight" are removed from memory and new ones are loaded.

8.1.2 LoadAllRecords Mode

Some of the more advanced features, like Print, Grouping Mode and Quick Sorting Mode, require that all records in the current dataset are loaded into memory. When needed SmartClient automatically shifts to this "LoadAllRecords" mode.
"LoadAllRecords" mode overrides the use of incremental fetch, which means that *all* records matching the current query or Time View settings will be fetched
As this mode is slower than the normal grid mode, it is only activated when required by one of the features mentioned above.
When SmartClient activates this mode, the message shown in Figure 8-1 will be displayed while the records are being loaded.

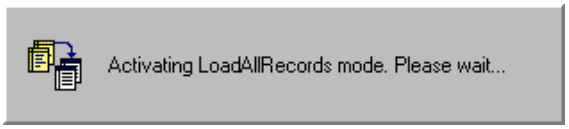


Figure 8-1

SmartClient will stay in LoadAllRecords mode until a table is refreshed or a new dataset is fetched with, for example, SQL Query or SQL Sort.

Due to the loading time, it is highly recommended to limit the number of records to max. 30000, using queries and/or Time View, before the LoadAllRecords mode is activated.

8.2 Desktop versus Server databases

This section describes some important differences between the two types of databases.

8.2.1 Desktop databases (Paradox)

Desktop databases do not have a real SQL engine supplying remote clients with data matching specific SQL queries.
The client therefore has to retrieve all records from the remote Desktop database, and then parse the records locally.
This means, that all records are transferred over the network, from the database to the client, even though maybe only 1 record matches the query.
For Desktop databases, the network speed is crucial to how fast a query executes.

Desktop database restrictions
It is recommended that tables are kept relatively small, i.e. less than 150.000 entries. This ensures reasonably performance for the SmartClient when executing sorting and querying operations.

For speed considerations, it is also recommended to enable incremental fetching (refer to section Database).

8.2.2 Server databases (Oracle or MS SQL Server)

Server databases contain a real SQL engine, which enables them to process SQL queries locally, and then only send the query result set to the client.
For Server databases, the network speed will be of less importance, since it is possible for the client to limit the number of records actually sent over the network.

8.3 WTS Information

The WTS information dialog, can be opened from the menu item *Tools* | *WTS Information...*
Please note that this menu item is only available if the SmartClient is the special WTS version.
The information shown in Figure 8-2 is the current user's individual WTS settings.

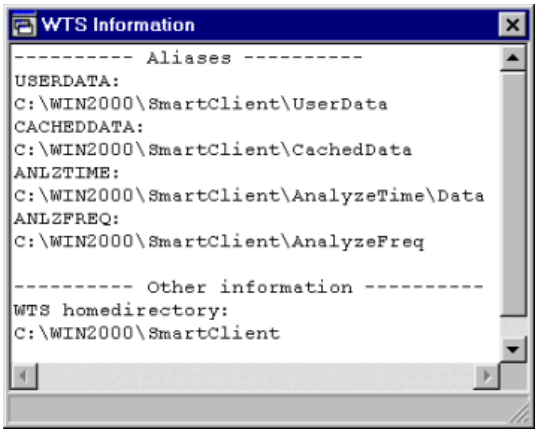


Figure 8-2